NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 453-8400

ISY

For Release

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July 1, 1992

RELEASE: 92-100

CHIEF ASTRONAUT TO RETIRE FROM NAVY AND LEAVE NASA

Capt. Daniel C. Brandenstein, Chief of the Astronaut Office, Johnson Space Center, Houston, since 1986 and veteran of four Space Shuttle missions, is retiring from the U.S. Navy and leaving NASA about Oct. 1 to pursue other interests.

Brandenstein commanded and flew the new orbiter Endeavour on the recent STS-49 mission to retrieve, repair and deploy the stranded INTELSAT-VI telecommunications satellite. During this mission, the crew conducted a record-setting four EVA's (extravehicular activity or spacewalks) to successfully rescue the satellite and to demonstrate and evaluate numerous EVA tasks to be used for the assembly of Space Station Freedom.

Selected by NASA in January 1978, Brandenstein first flew as a pilot on STS-8, the first night launch and landing in August-September 1983, aboard the Challenger. During the mission, crew members deployed the Indian National Satellite, operated the Canadian-built remote manipulator system (RMS) with the payload flight test article, operated the continuous flow electrophoresis system with live cell samples, conducted medical measurements to understand biophysiological effects of space flight and activated Earth resources and space science experiments.

On his second mission in June 1985, Brandenstein commanded the crew of STS-51G aboard Discovery to deploy communications satellites for Mexico (Morelos), the Arab League (Arabsat) and the United States (AT&T Telstar). Also, the RMS was used to deploy and retrieve the SPARTAN satellite after a rendezvous procedure by Brandenstein. In addition, the crew conducted a number of astronomy, materials processing, biomedical and other experiments.

- more -

Brandenstein also commanded the crew of STS-32 in January 1990 aboard Columbia to deploy the Syncom IV-F5 satellite and retrieve the Long Duration Exposure Facility using the RMS. The crew also operated a variety of life sciences and Earth sciences experiments. The IMAX camera was flown on this mission and the film incorporated into "The Blue Planet" about the Earth's environment.

With 789 hours in space, Brandenstein holds the record among Space Shuttle astronauts. He also has flown four of the five orbiters, and he has more rendezvous experience than any other pilot.

During his career, Brandenstein has earned a number of achievement awards, including NASA Distinguished Service Medals, the Defense Superior Service Medal, the Distinguished Flying Cross, NASA Outstanding Leadership Medals, Legion of Honor (France), Medal of King Abdul Aziz (Saudi Arabia) and numerous other awards and honors.

"For the past 14 years I have had the opportunity to have the most challenging and interesting job in the world. It has been exciting, rewarding and a pleasure to work with the many talented and motivated people who make up this country's space team. Although I have chosen to change careers, I always will be an avid supporter of the space efforts which I feel are essential to the advancement of knowledge and technology in this country," Brandenstein said.

"I'm sorry to see Dan go. He's one of the finest human beings I have ever had the privilege to know. He has been an outstanding astronaut, providing an example of excellence to which all others should aspire. His leadership skills are unparalleled here or elsewhere. I wish him the best in whatever he chooses to do," Center Director Aaron Cohen said.

Donald R. Puddy, Director of flight crew operations added, "Dan's experience and expertise certainly will be missed. His many extraordinary achievements as an astronaut and exemplary performance as a manager have provided the leadership that has been very valuable to the astronaut corps, the Johnson Space Center and NASA. I wish him continuing success as he pursues a new career."

- end -

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For Release

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July 2, 1992

RELEASE: 92-102

SAMPEX TO STUDY MYSTERIES OF SUN AND OUR GALAXY

NASA will launch the Solar Anomalous and Magnetospheric Particle Explorer (SAMPEX) spacecraft aboard a four-stage Scout rocket from Vandenberg Air Force Base, Calif., at 10:19 a.m. EDT on Friday, July 3. The launch window lasts 20 minutes. The launch will be carried live on NASA Select Television.

"This mission will collect samples of material from the sun and interstellar space that are as revealing to scientists as a rock from the moon," says Dr. David Gilman, NASA Headquarters program manager for the mission.

The 348-pound spacecraft is the first of a new series of Explorer missions which will enable scientists to develop less costly astronomy and space science experiments in a shorter period of time. SAMPEX was begun only 3 years ago.

The spacecraft has 4 separate instruments designed to measure atoms, ions and subatomic particles coming either from the sun or from the galaxy. Each of the instruments contributes to an understanding of the type of atom or atomic particle, its weight and energy, and the general direction of its travel.

Science teams from American and German science organizations comprise the spacecraft investigation team and will be collaborating for the mission's estimated 1-to-3 year lifetime. The data they analyze are expected to contribute new knowledge and improve our understanding of the evolution of our sun, the solar system, and galaxies.

- more -

Mission Seeks to Understand Anomalous Cosmic Rays

A principal SAMPEX goal is to confirm the origin of what are called anomalous cosmic rays. Anomalous cosmic rays are thought to be particles of the interstellar gas – the matter which exists in the space between the sun and other stars in our galaxy. These particles are thought to enter our solar system and are then hit by the sun's solar wind.

The spacecraft's peculiar 342-by-419-mile-high elliptical orbit will enable the onboard instruments to use the Earth as a giant magnetic shield. Using the Earth as a shield, the 4 instruments can determine if particles are coming from the sun, from the Milky Way Galaxy, or whether they are the anomalous cosmic rays.

The sun produces a cornucopea of particles – whole atoms, ionized atoms and individual protons, electrons and neutrons – in its nuclear furnace. Our Galaxy, the Milky Way, produces an equally rich variety of such particles but usually at speeds and energies much higher than those produced by the sun.

As the solar wind accelerates the intersteller gas particles, these interstellar particles are boosted in energy to levels where they are comparable to the very high energy particles called cosmic rays.

"This will greatly increase our knowledge of the sun and what appears to be the empty space between us and the nearest stars," Gilman said. Gilman says the SAMPEX instruments will collect 20 to 100 times more of this anomalous cosmic ray material than any previous mission.

- end -

NASA Select television is available on Satcom F-2R, Transponder 13, located at 72 degrees west longitude; frequency 3960.0 MHz, audio 6.8 MHz.

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For Release

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July 7, 1992

RELEASE: 92-103

ASSOCIATE ADMINISTRATOR FOR RUSSIAN PROGRAMS APPOINTED

NASA Administrator Daniel S. Goldin today announced the appointment of Samuel W. Keller as Associate Administrator for Russian Programs. The new function is being established within the Office of the Administrator and will give focus to the many programs involving NASA and the former Soviet Union.

"NASA is actively pursuing opportunities for expanded cooperation in space activities with Russia. This area of international cooperation is critical and warrants creation of this new position. Sam Keller has the kind of experience necessary to ensure that our relationship with the Russian space program is beneficial to both sides. He will be responsible for overall coordination of the NASA program relating to cooperative endeavors with the Russian space program," Goldin said.

Keller has served as Associate Deputy Administrator, NASA Headquarters, since May 1989. In that position he was the focal point for resolving institutional management and policy issues and provided agency leadership on US/Russian cooperative ventures carried out under agreements between the two governments.

Keller began his NASA career at the Goddard Space Flight Center,Greenbelt, Md., in 1960. After holding various managment positions, he was named the Director of Administration and Managment in 1972. In 1975, he transferred to NASA Headquarters and in 1981, was appointed Deputy Associate Administrator for the newly combined Office of Space Science and Applications. In that position he concentrated on the development of major space flight systems including the Hubble Space Telescope, Galileo, Magellan, the Gamma Ray Observatory and the Cosmic Background Explorer.

Before joining NASA, Keller held positions at the Naval Research Laboratory, the Applied Physics Laboratory of the Johns Hopkins University, RCA Laboratories and the Office of Naval Research. He served as a pilot in the U.S. Air Force from 1956 through 1959.

He holds a Bachelor of Science degree in Electrical Engineering from the University of Maryland and a Bachelor of Laws degree from George Washington University.

-more-

Keller was awarded the NASA Exceptional Service Medal in 1969, the Presidential Rank of Meritorious Executive in 1983 and 1990 and both the Presidential Rank of Distinguished Executive and the NASA Distinguished Service Medal in 1985.

-end-

NASA News

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For Release
July 9, 1992

RELEASE: 92-104

NASA AND DOE ENHANCE TECHNOLOGY TRANSFER TO INDUSTRY

To help bolster the competitiveness of American industry, the National Aeronautics and Space Administration and the Department of Energy (DOE) have formed an alliance to enhance the transfer of technologies developed in their laboratories to American enterprise.

"This agreement provides a solid framework and opportunity to draw together the experience and resources of both agencies," said NASA Administrator Daniel S. Goldin. "It demonstrates our commitment to strengthen and improve interagency cooperation in this vital area.

"We at NASA develop cutting-edge technology for our aeronautics and space programs. We view technology transfer as a way of life. It's one of our top priorities.

Through an agreement signed today by Goldin and DOE Secretary James D. Watkins, the two organizations will formally collaborate on technology transfer activities.

Areas of cooperation include outreach to business and non-profit research organizations, access to federal technology resources, training and education, dissemination of scientific and technical information, and technology transfer policy and program analysis.

"Some people ask why NASA spends money in space," Goldin said, "We don't. We spend it all on Earth -- and in the United States. The one percent of the federal budget -- and one-quarter of one percent of the GNP -- we invest in NASA is a vital investment in our nation's competitiveness."

- more -

NASA and DOE are among the federal agencies carrying out the National Technology Initiative (NIT), a nationwide series of conferences aimed at raising business awareness of opportunities to use federal research resources to develop competitive technologies.

"One of the benefits of the NTI has been the unprecedented level of cooperation in commercializing technologies it has produced among the federal agencies with research programs," Secretary of Energy Watkins said. "Through this agreement, DOE and NASA are putting in place formal procedures that will help assure that cooperation between our two agencies continues for the benefit of American competitiveness."

The agreement identifies the organizational units within each agency that will be responsible for implementing cooperation in technology transfer. NASA's Office of Commercial Programs' Technology Transfer Division conducts NASA's technology transfer effort, with program elements that include six Regional Technology Centers, the NASA field centers, the Computer Software Management and Information Center, the Technology Application Center and the NASA Technology Applications Team.

At DOE, the Office of the Science and Technology Advisor and the Office of Technology Utilization oversees technology commercialization. The department's cooperative research with private partners is carried out primarily by DOE's network of laboratories.

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For Release

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July 9, 1992

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RELEASE: 92-105

NASA SCIENTISTS "FLY" COMPUTERIZED FIGHTER AIRCRAFT IN 3-D

NASA researchers have "flown" a complete three-dimensional, high-performance aircraft in a supercomputer for the first time.

Dr. Yehia Rizk, a scientist at NASA's Ames Research Center, Mountain View, Calif., reproduced the complete flow of air around an F/A-18 jet fighter. The air flow field, which duplicates high angle-of-attack (nose-high) flight, lets researchers analyze the unsteady air flow that causes sporadic buffeting of tail surfaces and lets scientists study improved control systems for the plane's forward fuselage.

"This achievement is a milestone for the aerospace industry," said Dr. Paul Kutler, Chief of the Fluid Dynamics Division at Ames. "It will be a long time -- if ever -- before supercomputers replace wind tunnels. But supercomputers are ever more important. For wind tunnel tests, an expensive fixed-design model must be built. In a supercomputer, aircraft shapes can be altered frequently and radically, potentially a far cheaper research process."

Aerodynamic studies of fighters such as the F/A-18 are very useful because these planes make extreme maneuvers, and findings can be applied to all other classes of aircraft.

Kutler said the new supercomputer techniques also appear to have promise in other areas where fluid flow is modeled, such as weather prediction, spacecraft entry, artificial heart design, ship and automobile concepts, jet and rocket engine design and studies of galaxies and interstellar gas.

- more -

The research is part of an effort to reduce wind tunnel tests of new aircraft designs. Supercomputer design has the potential to be less costly and gives data not available from wind tunnels, such as greater detail on flight conditions.

Developing the full F/A-18 flow took 2 years. It now takes about 50 hours to enter the program and data into the computer, Rizk said, but he hopes to reduce program entry time to several hours within the next year or two and by the year 2000, to a few minutes.

For complete flow-field simulations, data to recreate a particular aircraft shape in 3-D is entered in the computer. Researchers can view the design from any angle on the computer's color display screen. Then, a three-dimensional grid is created around the vehicle.

The grid for the F/A-18 has more than a million points at which the basic air flow equations are recalculated many thousands of times to reproduce the "real" flow around the vehicle. From the computer display, researchers get information such as colored lines showing paths of individual air particles moving through vortices (whirlpools of air) and turbulence around the craft.

Aircraft like the F/A-18 -- with twin tails, two jet engines and forward controls -- present interrelated problems. Both the plane's complex shape and the physics of the resulting intricate air flow must be dealt with. The wing leading edge creates a vortex, adding lift. The vortex then intercepts the canted tail, providing better control. But at the high nose-up flight position needed for tight turns, the vortex bursts, producing unstable flow.

Rizk wrote new software to handle the complex geometry. He then put together 10 different types of three-dimensional grids around the entire craft. To make sure all the grids "talk" to each other, he uses a special Ames grid-integrating computer code.

The multiple-grid approach allows different grid densities, equations and turbulence models as required. Once the grids are in place, algorithms (computer arithmetic) are written to solve the flow equations at millions of points.

Other Ames researchers have created the complete flow field around an F-16 fighter in level flight at 700 mph. They now are seeking to control laminar (smooth) air flow around an F-16 fitted with a delta-wing at speeds up to Mach 2 (1,400 mph).

-end-

EDITORS NOTE: A 6-minute, 3/4-inch video clip is available to media by calling 202/453-8594. The video will be played on NASA Select television at 1 p.m. EDT on July 9. Photographs also are available to illustrate this release by calling 202/453-8375.

Color: 92-HC-402 through -407
B&W: 92-H-452 through -457

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July 9, 1992

RELEASE: 92-106

GOLDIN AND DAILEY LEAD INTERAGENCY DELEGATION TO GERMANY AND RUSSIA

NASA Administrator Daniel S. Goldin and National Space Council Executive Secretary Brian Dailey today will lead an interagency delegation to Germany to visit the European Space Operations Center, then to Moscow to gain a first hand understanding of Russia's space program.

Plans for the delegation's trip to Russia follow discussions between Vice President Dan Quayle and Russian President Boris Yeltsin, during his recent visit to Washington, D.C.

The delegation leaves Washington this afternoon and returns July 17.

European Space Operations Center

This Friday, July 10, the delegation will participate in a ceremony to mark the expected encounter of Giotto, an European Space Agency (ESA) spacecraft, with the comet Grigg-Skjellerup.

In 1986, Giotto returned to Earth excellent images of Halley's comet during its rendezvous with Earth. While Giotto's camera was damaged in the encounter, ESA devised a procedure to continue its science-gathering capability and steered it toward Grigg-Skjellerup, a comet located 134 million miles from Earth.

The ceremony, hosted by ESA Director General Jean-Marie Luton, will take place at the European Space Operation Center in Darmstadt, Germany.

The delegation will also meet with Luton to discuss joint programs. NASA has extensive cooperative agreements with European national space programs, including Space Station Freedom, the U.S.-French Topex-Poseidon oceanographic mission scheduled for launch in August, the U.S.-Italian Tethered Satellite mission and ESA's EURECA spacecraft on the next Space Shuttle and the German D-2 Spacelab.

-more-

Russian Visit

On Saturday, July 11, the delegation travels to Moscow to begin several days of meeting with key Russian space officials. The delegation will also tour facilities in the area that are involved in human and robotic space activities, including NPO Energia, NPO Energomash, Khurnichev, KP Salyut, Babakhin, Lavotchkin, NPO Zvezda and Star City.

"The primary importance of the trip to Moscow is to get a first hand look at the Russian space program and to begin the process of building a long term relationship," Goldin said.

"I believe that it is important, that as we build this partnership with Russia, we provide opportunities for U.S. industry. Clearly a strong partnership exists between our nation, Canada, Europe and Japan. This partnership was builtover decades of mutual cooperation and trust. The time has come to begin to develop similar bonds with Russia," Goldin added.

Russian Space Agreement

On June 18, Goldin and Yuri Koptev, Director General of the Russian Space Agency, ratified the first contract between NASA and a Russian aerospace firm, NPO Energia, to study the possible use of the Soyuz TM as an emergency interim spacecraft for Space Station Freedom.

The contract also includes funding to examine the Russian automated rendezvous and docking system known as APAS and the possible use of the MIR space station for life science experiments.

The formal ratification of the contract concluded three months of technical meetings and negotiations between NASA and NPO Energia.

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July 9, 1992

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RELEASE: 92-107

NASA, DOE SIGN PACT ON ENERGY-RELATED SPACE ACTIVITIES

NASA Administrator Daniel S. Goldin and Secretary of Energy James D. Watkins today signed a cooperative agreement on energy-related civil space programs.

Today's agreement provides "umbrella" principles that outline the responsibilities and authority of both NASA and the Department of Energy (DOE) in research and development, fundamental science, advanced technology development and education efforts.

"This agreement is the latest step in a fruitful history of cooperation between NASA and the Department of Energy, which has existed since the beginnings of the U.S. space program," said Goldin. "Combining the respective strengths of our agencies will make sure that our future space endeavors will succeed and pay off for the nation --even more effectively than they have in the past."

In energy and energy-related research and development, the agencies will coordinate their efforts in renewable energy programs and will identify activities that address NASA's civil space power needs.

The agencies agreed to continue ongoing research in space nuclear power. DOE will design, build and test space nuclear power and propulsion subsystems. For NASA missions that require nuclear propulsion, NASA will be responsible for systems requirements and overall program management of space nuclear propulsion systems, system integration and launch and space operations. Both agencies will ensure that their space nuclear-related activities meet environmental, safety and security requirements.

- more -

In activities connected with the U.S. Global Change Research Program, NASA will lead the definition of the space-based part of the program with DOE support.

Today's agreement also covers fundamental science research. DOE irradiation facilities, including particle accelerators, will support NASA life sciences, space physics and spacecraft development activities designed to understand the radiation effects of long-duration spaceflight for both humans and hardware. The agencies also agreed to continue research in space physics and astrophysics to support the nation's space science program.

NASA and DOE agreed to cooperate on developing advanced technology to meet critical civil space needs, which will be defined and incorporated in NASA's Integrated Technology Plan for the civil space program. The agencies also reaffirmed their commitment to programs that improve U.S. science education and will attract more young people to science, engineering and mathematics careers.

NASA/DOE collaboration on specific projects will be detailed in subsequent agreements that will address the agencies' respective roles and responsibilities, performance and schedule requirements and funding.

- end -

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For Release

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July 13, 1992

RELEASE: 92-108

NASA STARTS MICROBURST WINDSHEAR WARNING FLIGHT RESEARCH

NASA today started the first flight test in Denver of a laser-based sensor to provide airline pilots with advance warning of "microbursts" that can harbor potentially dangerous windshears.

A microburst is an intense downdraft that produces strong divergent winds near the ground, typically for a short duration and over a relatively small area. When an airliner is taking off or landing, a microburst can force the plane into the ground before the flight crew can take proper corrective action.

"NASA's Boeing 737 research aircraft mounts several instruments to detect hazardous windshear," said Herbert Schlickenmaier, Program Manager at NASA Headquarters. "We are most interested in sensors that will provide a minimum of 20-40 seconds advanced warning of microburst windshear conditions, which NASA research has shown is enough time for pilots to avoid the hazard."

Schlickenmaier noted that the Federal Aviation Administration (FAA) has mandated airlines must select and install an approved microburst detection system on their aircraft by the end of 1995.

The flights in Denver will take place July 13-27. Tests in Orlando, Fla., will occur from early August through early September. During the deployments, the 737 research plane will be directed toward microbursts using experimental ground-based Doppler radar that also is designed to spot windshear.

- more -

During the tests, scientists and engineers aboard the NASA Boeing 737 will evaluate how well the laser-based Doppler LIDAR (light detecting and ranging) system and other sensors seek out microbursts. The 737 will fly at low altitude directly into microbursts and other severe weather conditions under strict safety criteria.

The flight tests are part of a $20-million-plus 1986 research agreement signed between NASA and the FAA. The agreement calls for the development of technology for airborne windshear detection and avoidance. The 737 flights, managed by NASA's Langley Research Center, Hampton, Va., are the final phase of the joint program.

The Doppler LIDAR system, to be flight-tested for the first time in Denver and Orlando, reflects energy from "aerosols" (tiny particles) moving inside a storm. NASA researchers also expect the tests to yield more data on two other airborne windshear sensors tested last year.

A microwave radar system finds microbursts by measuring sudden, large changes in the speed of raindrops in storm cells ahead of the airplane. Another system uses an infrared light sensor to detect microbursts by measuring air temperature differences ahead of the plane.

The flights also will test a Langley-developed data link between ground weather radar and the 737. Researchers are developing a system that automatically sends windshear data from ground radar to a display in an airplane cockpit. Currently, warnings from the ground usually are relayed by voice -- a slower, less precise method.

Dr. Roland Bowles is the Project Manager at Langley Research Center. Dick Yenni is forward deck pilot on the NASA 737, and Michael Phillips is Co-pilot. Lee H. Person, Jr. is the Research Cockpit Pilot.

- end -

NOTE TO EDITORS: A 3/4" video clip on windshear and the NASA flight tests is available to media by calling 202/453-8594. Still photos are available by calling 202/453-8375. A graphic illustrating windshear is available by calling 202/453-2754.

Color: 92-HC-424 to -433
B&W: 92-H-474 to -483

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July 13, 1992

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RELEASE: 92-109

OCEAN PROJECT TO IMPROVE FORECASTING AND MEASUREMENTS

Scientists from the United States and Australia have completed a project that is expected to improve the reliability of ocean wave forecasting and improve measurements from the TOPEX/POSEIDON satellite.

The U.S./French satellite, scheduled for launch in August 1992, will study ocean topography and circulation, leading to a better understanding of the oceans' role in global climate change.

"What we need to know is how the wind energy is converted into waves and currents under all sorts of conditions, particularly during severe storms," said Dr. Chris Fandry of the Australia Commonwealth Scientific and Industrial Research Organization's (CSIRO) Office of Space Science and Applications.

"Only recently have oceanographers recognized the dominant role of waves in transferring energy from the wind to the current," said Dr. Mike Banner from the University of New South Wales (UNSW). "Equally important is the strong influence of the waves on the winds. Understanding these processes is a high priority in this experiment."

- more -

As part of the Southern Ocean Waves Experiment (SOWEX), scientists observed how ocean winds and waves affect one another from June 6 through 18, 1992, off the coast of Australia. Instrument measurements were conducted from aircraft flying in winds ranging from light and variable to gale force. Data was collected in winds measuring 3.5 mph over calm seas to winds measuring 57.5 mph over seas with 26-foot waves.

According to Dr. Ed Walsh of NASA's Wallops Flight Facility (WFF), Wallops Island, Va., this was the first time that wind stress and sea surface topography were measured simultaneously under such a wide range of wind speeds and wave heights. CSIRO instruments studied wind stress while the Goddard Space Flight Center's (GSFC) Scanning Radar Altimeter observed the sea's topography.

"These data will significantly improve the performance of TOPEX/POSEIDON in the southern ocean and anywhere else there are high winds and waves," Walsh added.

The research plane, owned by CSIRO, flew the experimenters as low as 40 feet and as high as 4,000 feet altitude. On most of the experimental flights the pilots flew at 50 feet altitude for more than 40 minutes each day.

The information collected will improve the reliability of wave forecasting and help scientists understand more about climate change and the oceans and how the oceans affect our weather.

The main instrument on the TOPEX/POSEIDON is a GSFC/WFF-managed radar altimeter developed by the Johns Hopkins Applied Physics Laboratory, Baltimore, Md. The goal of the altimeters on the TOPEX/POSEIDON satellite is to measure mean sea level to an accuracy of a few centimeters. Walsh said wave depressions reflect an altimeter's radar signals better than the wave crests, causing an error in the measurement.

To measure the magnitude of this bias in the range measurements during SOWEX, an instrument interspersing pulses similar to TOPEX/POSEIDON's was developed by Dr. Bob McIntosh of the University of Massachusetts at Amherst. The data collected during the Australian project will aid scientists in developing models to improve measurements by the TOPEX/POSEIDON altimeters.

The SOWEX was developed under the U.S.-Australia Cooperative Science Program and included investigators from the UNSW, CSIRO, the University of Massachusetts at Amherst and GSFC. The U.S. investigators were funded by the National Science Foundation. TOPEX/POSEIDON is managed by the Jet Propulsion Laboratory, Pasadena, Calif.

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July 15, 1992

RELEASE: 92-110

WORK BEGINS ON HIGH-ALTITUDE ATMOSPHERIC RESEARCH PLANE

Construction has started on a high-flying, lightweight, unpiloted research aircraft called "Perseus" that NASA will use to measure ozone levels and other atmospheric conditions.

NASA sees Perseus as the first step toward general use of advanced aircraft for many aspects of Earth sciences research such as climate and radiation studies, tropical dynamics, meteorology and for studies of the stratosphere and troposphere.

"Aircraft measurements give a more detailed view than satellite measurements," said Phil Russell, Small High Altitude Science Aircraft project scientist at NASA's Ames Research Center, Mountain View, Calif. "This view is often essential to understanding how global change processes work."

Russell noted that Perseus is the first plane specifically designed for science and is "a major addition to the set of tools we have to understand the upper atmosphere better. With the ozone depletion issue, it is even more critical that we have a suitable platform to conduct cost-efficient science in these regions."

The data will improve scientists' understanding of the stratosphere -- altitudes above 40,000 feet -- including possible effects of exhaust from future high-speed transport aircraft.

- more -

Aurora Flight Sciences Corp., Manassas, Va., won a $2.25 million contract to design, build and flight test two Perseus aircraft. Perseus is being developed with funds from NASA's High Speed Research Program and the Upper Atmosphere Research Program.

Perseus will be delivered to NASA next year. Flight tests are slated to begin in late 1992 at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif. New Tool for Atmospheric Research

Perseus has several advantages over other methods of taking high-altitude measurements. Research balloons, for example, are not as controllable as remotely piloted vehicles. Balloons also are difficult to launch, are affected by adverse weather conditions and sometimes burst, causing the loss of expensive instruments.

NASA's high flying ER-2 aircraft, while they can carry up to 2,700 pounds of science instruments, have a 70,000-foot ceiling -- well below Perseus' maximum altitude. Perseus can fly higher than any other subsonic aircraft. It will carry up to 110 pounds of scientific instruments to altitudes of 82,000 feet.

"Since Perseus is unpiloted, there is an additional advantage in using it under flight conditions that might jeopardize the safety of a piloted aircraft," said Jennifer Baer-Riedhart, Small High Altitude Science Aircraft Project Manager at NASA's Ames-Dryden Flight Research Facility.

Baer-Riedhart said Perseus' first science mission, an ozone research flight for NASA's High Speed Research Program, is scheduled for 1994. The mission will improve understanding of how exhaust from high-speed aircraft might affect the stratosphere, including the ozone layer.

Perseus Specifications

Perseus will fly for up to 6 hours and cruise at its maximum height for 1 hour. The aircraft will have a top speed of 150 knots and a range of 1,000 miles.

Perseus will be made of lightweight composite materials, such as graphite and Kevlar, much like high-performance sailplanes or gliders. It will have a wing span of 58.7 feet and will weigh only 880 pounds.

The plane will be powered by a liquid-cooled, closed cycle, rotary engine rated at 50 kilowatts that will burn a mixture of gasoline and oxygen, diluted by recirculated exhaust gas. Aurora Flight Sciences developed the engine under a $500,000 Small Business Innovative Research Program grant from Ames Research Center. A winch-driven cable will pull Perseus forward for take-off and the propeller will engage after the cable is released.

Although a pilot on the ground can command the aircraft remotely, Perseus mostly will fly itself using an onboard computer with preprogrammed flight plans. The autopilot will compute the aircraft's location using signals from the Global Positioning System, a worldwide constellation of U.S. navigation satellites. Perseus also can respond to changes in wind direction and speed.

- end -

NOTE TO EDITORS: A short 3/4-inch video clip on Perseus is available to media by calling 202/453-8594. A photo also is available to illustrate the release by calling 202/453-8375:

Color: 92-HC-450 B&W: 92-H-500

NASA News

National Aeronautics and
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Washington, D.C. 20546
AC 202 453-8400

ISY

For Release

Paula Cleggett-Haleim
Headquarters, Washington, D.C.
(Phone: 202/453-1547)

Jim Elliott
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July 15, 1992
EMBARGOED Until 1 p.m. EDT

RELEASE: 92-111

HUBBLE CLOSES IN ON THE CAUSE OF SOLAR FLARES

A fleeting event on a tiny red star could help scientists explain the cause of flares that erupt on the sun and have pronounced effects on the Earth, reported Hubble Space Telescope (HST) astronomers from NASA's Goddard Space Flight Center, Greenbelt, Md.

"This is a case where observing another star can help us understand our own sun," said Dr. Bruce E. Woodgate, who led the science team making the new finding. The stellar flare event was monitored by the Goddard High Resolution Spectrograph on HST on Sept. 3, 1991.

The Hubble observers found evidence of a powerful beam of downward-streaming protons (nuclear particles with a positive electrical charge) at the onset of a stellar flare.

The telltale evidence of the proton beams was a brief but striking increase in the intensity of ultraviolet radiation at wavelengths slightly longer than the characteristic wavelength of "Lyman-alpha," the principal radiation emission of hydrogen atoms. This radiation was caused by protons moving downward at high speed in the atmosphere of the observed star (called AU Microscopium).

"As the protons move downward, they collide with hydrogen atoms and rob them of their electrons," Woodgate explained. "That makes the rapidly descending protons become hydrogen atoms."

- more -

"The atoms emit their characteristic light of Lyman-alpha. But because the atoms are moving downward on the star and therefore, are moving away from us as we look at the star, the light is shifted to longer wavelengths by the Doppler effect," said Woodgate.

To recognize the observed effect as corresponding to the predicted proton beams, the Hubble observers required that the phenomena must occur at the onset of a stellar flare, in the so-called impulsive phase of the flare and that it be of very short duration. In fact, the increase of light that they found near the start of the flare on star AU Microscopium lasted only 3 seconds.

No other such brightening was observed at any other time during two hours of monitoring with the Hubble telescope, leading the scientists to estimate that there is only one chance in 40,000 that they had recorded a coincidental effect not related to the stellar flare. Nevertheless, the scientists are planning further observations with HST to verify their finding.

The occurrence of this phenomenon in flares on the sun was predicted in 1976 by American astronomers Frank Q. Orrall and Jack B. Zirker. But instruments on sun-watching satellites have not had the necessary capabilities to detect it.

"We tried to find proton beams in solar eruptions using the Solar Max satellite," explained Dr. Steve Maran, one of the authors contributing to this research, "but the spectrograph could not obtain measurements at a sufficiently rapid rate." The Solar Maximum spacecraft was launched on Feb. 14, 1980, and reentered the Earth's atmosphere on Dec. 2, 1989.

"We've been studying this for 15 years to find the first possible confirmation of the theory," Woodgate said. Woodgate and associates Drs. Kenneth G. Carpenter and Stephen P. Maran collaborated with Drs. Richard D. Robinson and Steven N. Shore, of Computer Sciences Corp., all who work at Goddard.

The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency.

- end -

EDITORS NOTE: A 35-second video showing animation of the stellar flare is available to the news media by calling NASA's Broadcast and Imaging Branch on 202/453-8375.

NASA News

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July 15, 1992
EMBARGOED Until 1 p.m. EDT

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RELEASE: 92-112

COMPTON DISCOVERS "GAMMA RAY AFTERGLOW" ON THE SUN

Solar scientists are puzzling over an unexpected "gamma ray afterglow" discovered on the sun by NASA's Compton Gamma Ray Observatory.

The glow, a strong emanation of high-energy gamma rays, persisted for more than 5 hours after a solar flare explosion on June 11, 1991, Dr. James M. Ryan, of the University of New Hampshire, reported at a briefing at NASA Headquarters in Washington, D.C., today.

A similar phenomenon occurred four days later, this time lasting more than 90 minutes, he said.

One theory is that the glow resulted when protons, boosted to energies of tens and hundreds of millions of electron volts by magnetic processes in the explosion, were stored in a series of magnetic loops, Ryan explained.

They apparently constituted a coronal arcade or so-called "magnetic slinky" in the sun's outer atmosphere or corona, he said. Protons are subatomic particles resulting from a nuclear reaction.

If the theory is correct, Ryan said, the protons are stored at the sun much the same way as protons are stored in the Earth's Van Allen radiation belts. However, on the sun, he explained, they slowly leak out to produce the gamma rays seen by the Compton Observatory.

- more -

Under those circumstances, scientists can draw an analogy from the Earth environment and apply it to the sun's environment, Ryan explained. Thus, if scientists' understanding of how particles behave in the Van Allen radiation belts can be applied to the sun, that knowledge would improve their understanding of what's happening on the sun, he continued.

The work was accomplished using the Energetic Gamma Ray Experiment Telescope and Imaging Compton Telescope instruments on the observatory by Drs. Gottfried Kanbach and Mark McConnell of the Max Planck Institute for Extraterrestrial Physics in Garching, Germany, and the University of New Hampshire, respectively.

The Compton Gamma Ray Observatory is managed by the Goddard Space Flight Center, Greenbelt, Md., for NASA's Office of Space Science and Applications, Washington, D.C.

- end -

EDITORS NOTE: To illustrate this story, three photographs are available to the news media by calling NASA's Broadcast and Imaging Branch on 202/453-8375. The photo numbers are:

Color	B&W
92-HC-451 thru -453	92-H-501 thru -503

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For Release
July 15, 1992

RELEASE: 92-113

FIRST IMAGE OF SUN IN NEUTRONS

NASA's Compton Gamma Ray Observatory has taken the first image of the sun in neutrons. It is the first picture of any celestial object ever made with neutrons.

Neutrons are heavy subatomic particles without any electrical charge. Until today, all images of cosmic objects have been obtained with one or another form of light -- for example, radio, infra-red, visible, x-ray and recently gamma rays (from Compton). Scientists now have a picture of the sun in taken in the "light" of neutrons, which is matter rather than light.

"This represents a technological breakthrough," says Dr. Jim Ryan, University of New Hampshire, Durham, "being able to capture an image through the transmission of matter rather than electromagnetic radiation." Dr. Ryan is co-principal investigator on the COMPTEL experiment, one of four instruments on the Compton Observatory.

The image was obtained after the large solar flare (an immense explosion on the sun) of June 15, 1991.

The neutrons, created in nuclear collisions on the sun, were detected when they penetrated the radiation sensors in the COMPTEL experiment onboard the Compton Observatory and produced flashes of light that were recorded by photomultipliers in the experiment. The image was then constructed in a computer.

Solar flares have dramatic effects on the Earth's atmosphere and other aspects of the environment. The Compton Observatory was deployed from the Space Shuttle Atlantis on April 7, 1991. It was developed by and is managed and operated by Goddard Space Flight Center, Greenbelt, Md., for NASA's Office of Space Science and Applications.

- end -

EDITORS NOTE: Two images are available to the news media by calling NASA's Broadcast and Imaging Branch at 202/453-8375. The photo numbers are:

Color	B&W
92-HC-454	92-H-504

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For Release

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July 16, 1992

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RELEASE: 92-115

NASA EXPERIMENT COULD SAVE LIVES, TIME AND MONEY

A group of dedicated Alaskans has started a 3-year experiment that ultimately could result in saving the lives of thousands of campers, hunters, boaters and others.

The Alaskans will test the use of a small emergency radio transmitter, known as a Personal Locator Beacon or PLB, to communicate with a 10-year-old search and rescue satellite system that up to now has been used primarily for aircraft and ship emergencies.

"We are confident the experiment will prove the value of these emergency devices," explained Wayne Hembree, NASA's Search and Rescue Mission Manager at Goddard Space Flight Center, Greenbelt, Md.

"Use of the beacons by people in remote areas undoubtedly will save lives," he continued. "Their use also will lower search times and costs and reduce the dangers to personnel conducting the rescue missions."

The experiment is being carried out with the cooperation of NASA, the National Oceanic and Atmospheric Administration, the U.S. Air Force and the U.S. Coast Guard.

International Program Successful

The satellite system, an international program known as COSPAS-SARSAT, has been responsible for saving more than 2,300 lives since it was started in 1982. Principal partners in this program are Canada, France, Russia and the United States.

- more -

That PLB program calls for four low-Earth-orbiting satellites to be in operation. Currently, there are six satellites -- three Russian and three U.S. -- circling the Earth in polar orbit. However, only four are fully operational, the other two having lost some of their capabilities.

The Russian satellites primarily are navigational aids for that nation's ocean-going merchant marine. The U.S. satellites are meteorological satellites. In both cases, the search and rescue equipment "piggy backs" on the satellites as a secondary payload.

When an aircraft or ship is in distress, an emergency signal normally will be transmitted. The signal will be "heard" by one of the satellites, which relays the information to ground stations around the world. Alert information, including identification and location, is forwarded by the ground stations to search and rescue forces, and rescue efforts are begun.

Until now, the only government-approved emergency beacons are Emergency Locator Transmitters (ELTs) for aircraft and Emergency Position Indicating Radio Beacons for ships. The PLB experiment is designed to prove the need for a lightweight beacon that can be carried and used in an emergency by individuals.

The test is being funded by the North Slope Borough Search and Rescue Department (NSBSAR), according to Charles Caldwell, the project coordinator for the borough. NSBSAR provides year-round assistance to overdue hunters, boaters, whaling crews and aircraft, employing a staff of 14 personnel, three aircraft and two helicopters.

Most Remote Alaskan Area

The North Slope Borough is one of the most remote areas of Alaska. It covers 92,000 square miles (an area about the size of Utah) and has what might be described as eight towns and villages. There are no roads to speak of, and travel is accomplished by amphibious vehicle in the summer and by snowmobile in the winter, Caldwell explained.

Twenty beacons, which currently cost between $1,200 and $1,700, will be used in the experiment. The beacons, which transmit the emergency signal on a 406 Megahertz (Mhz) frequency and have a 121.5 Mhz signal to allow search parties to "home-in" on the location, will be loaned to qualified applicants.

The beacons not only will help save lives, Caldwell explained, but also will lower costs of search operations. The operational cost of one of the borough's helicopters, for example, runs $3,000 an hour. Multiply that by the number of missions flown in a year, and the savings could really mount up, he explained.

During the first 6 months of this year, he continued, the borough conducted 30 search missions, rescuing 29 persons. In most cases, he explained, the search plane or helicopter proceeded to the village nearest the emergency, picked up a spotter and began the search. The search under those circumstances can take hours or even days.

With a PLB, he said, the emergency signal would be picked up by a satellite within 55 minutes, the information sent to a rescue coordination center, and the rescue party could be at the scene shortly thereafter. In pre-experiment trials, Caldwell said, the PLB has brought searchers to within six-tenths of a mile and never more than 1.3 miles of the distress situation. Caldwell said the borough hopes to petition the Federal Communications Commission to approve the use of PLBs in about a year.

Caldwell and the search and rescue people face somewhat of a paradoxical situation. They do not want to see people in emergency situations on the one hand. However, statistics are needed to show the value of the PLBs by an accounting of the number of rescue missions and lives saved to support the petition.

Caldwell knows what a person experiences in an emergency of that type. Since 1983, using the aircraft ELT for signalling a satellite, he has been rescued three times when something went wrong with his aircraft or another plane in the rescue party.

- end -

EDITORS NOTE: One photograph to illustrate this release is available to the news media by calling NASA's Broadcast and Imaging Branch on 202/453-8375.

B&W: 92-H-439

NASA News

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For Release

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July 20, 1992

EDITORS NOTE: 92-62

NASA/NIH SIGN RESEARCH AGREEMENT ON TUESDAY AT NOON

Media are invited to attend a biomedical and behavioral research agreement signing ceremony between NASA Administrator Daniel S. Goldin and National Institutes of Health Director Bernadine Healy, MD at the Dirksen Building, Room 138, at noon, Tuesday, July 21, 1992.

Senator Barbara Mikulski will host the event. The Senator has been a leader in advocating collaboration between NASA and NIH in the fields of biotechnology and biomedical research.

The participants will make brief remarks and respond to questions.

The signed agreement will enhance each agency's biomedical and behavioral research capabilities. The agencies will develop programs that apply NASA's unique expertise to practical medical needs on Earth and in spaceflight.

- end -

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For Release
July 20, 1992

RELEASE: 92-116

GOLDIN ANNOUNCES PLANS TO IMPLEMENT NEW INITIATIVES WITH RUSSIA

Following a 7-day trip to Russia and the Ukraine, NASA Administrator Daniel S. Goldin today announced plans for the United States and Russia to implement the agreements Presidents Bush and Yeltsin announced on June 17, 1992.

Goldin said significant progress was made in developing a plan to carry out a wide range of projects, including expansion of cooperation in life sciences and global change research, the exchange of an American astronaut and Russian cosmonaut, and a Space Shuttle rendezvous and docking with the Russian Mir space station.

"In our relationship with Russia, we need to start slowly and deliberately to build a strong foundation of cooperation," Goldin said. "In this way we will ensure that what we do together will be successful, both technically and scientifically."

Goldin said much had been learned on the interagency trip, which was jointly led by National Space Council Executive Secretary Brian Dailey, and which was agreed upon by Vice President Quayle and President Yeltsin in a meeting last month. The delegation included Assistant Secretary of the Air Force Martin Faga and representatives from the National Security Council, State Department and the Central Intelligence Agency.

"The delegation had the opportunity to take a closer look at Soyuz-TM, the Russian docking system and at their human spaceflight operation," Goldin said. "We also learned a lot about the capabilities of the Mir space station and discussed ways to expand critical life science research and global change research."

Goldin said both the United States and Russia agreed to encourage private companies to expand their search for new commercial space business and agreed to facilitate appropriate contacts.

-more-

Both countries also agreed that the docking mission planned in 1994 with Russia would highlight biomedical science.

NASA and the Russian Space Agency agreed -- pending an appropriate review and approval of the governments of the two countries -- to continue the activities now underway by the five working groups established under the 1987 joint agreement with the Russian Academy of Sciences. Additional initiatives will be undertaken by the Working Group of Space Biology and Medicine which will now concern itself with life support systems.

The agreement also included:

** study the possible use of Mir for long lead-time life sciences research;

** establish a new working group to develop a plan to enhance cooperation on global change research (Mission to Planet Earth);

** recommend cooperative biomedical research projects for future missions, including the missions involving the exchange of a Russian cosmonaut and an American astronaut and the Space Shuttle/Mir rendezvous and docking mission;

** study the feasibility of further enhancing the biomedical capabilities on Mir using instruments from the U.S.; and

** study the possibility of closed-loop life support experiments with humans over different periods of time and to define the requirements for long duration missions.

Goldin said he also discussed the acquisition by the United States of a small Russian lander to carry U.S. experiments that would be one of three landers flown on the Russian Mars '94 mission;

The Russian and Ukraine trip followed a series of meetings between President Bush and President Yeltsin, during the June summit in Washington when they discussed a series of space initiatives.

At the summit, Bush and Yeltsin signed the Joint Statement on Cooperation in Space. Goldin and Yuri Koptev, Director of the Russian Space Agency, also ratified the 1992 United States-Russian Space Cooperation Agreement.

-end-

NASA News

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For Release
July 20, 1992

RELEASE: 92-117

NASA'S UPPER ATMOSPHERE RESEARCH SATELLITE RESUMES OPERATIONS

NASA's Upper Atmosphere Research Satellite (UARS) has resumed full science operations following the resolution of problems with the satellite's solar array drive.

"All 10 instruments are turned on and should be fully operational by late July 20," said John Donley, UARS Deputy Project Manager, NASA's Goddard Space Flight Center, Greenbelt, Md.

Flight controllers placed UARS in a "safe mode" and turned off the instruments June 2 after observing the solar array drive was not operating smoothly and the solar array itself was not properly tracking the Sun.

The team issued commands that repositioned the array to "high noon," allowing the array to receive maximum solar energy for one-half of each orbit.

With the solar array parked, UARS had enough power in its "safe" mode to operate two instruments, the Cryogenic Limb Array Etalon Spectrometer (CLAES) and the Microwave Limb Sounder (MLS), which were turned on June 10 and June 14, respectively. The two instruments continued to obtain unprecedented data on levels of ozone and chemicals involved in ozone depletion in the upper atmosphere.

In this condition, the spacecraft remained healthy while UARS project officials ran extensive diagnostic tests and analyzed the problem. Working with a failure review team, project officials determined that a spring on the solar array's "A" side drive was not completely releasing from the shaft of the solar array.

The condition was such that the redundant "B" side drive, which was otherwise operational, could not be used. However, based on a thorough review of the test data, project officials determined that engineers could operate the solar array using the "A" drive and allow all 10 instruments to perform normally.

- more -

On July 8, the operations team began rotating the solar array. The array responded as expected, and the flight operations team began turning on several more of the instruments.

This process was stopped, and the solar array parked once again on July 13 when UARS made its yaw maneuver, a normal turning of the spacecraft from front to back or back to front. This procedure takes place approximately every 36 days to adjust the viewing angle of the instruments relative to the Sun. The rotation was subsequently resumed in preparation for full operation.

On July 14, the Halogen Occultation Experiment (HALOE) was turned on. On July 16, CLAES resumed operating, and by late July 20 all instruments were expected to be operating.

UARS was launched Sept. 12, 1991, aboard the Space Shuttle Discovery. It is providing scientists with their first comprehensive data on the chemistry, dynamics and energetics of the Earth's upper atmosphere, focusing particularly on ozone depletion. UARS is the first major satellite element of NASA's Mission to Planet Earth, a coordinated, long-term program to study the Earth as a global environmental system.

The UARS is managed and operated by Goddard Space Flight Center for NASA's Office of Space Science and Applications, Washington, D.C.

- end -

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For Release
Embargoed until
July 21, 1992

RELEASE: 92-118

NASA AND THE AEROSPACE INDUSTRY JOIN FORCES FOR EDUCATION

NASA Administrator Daniel S. Goldin announced that NASA and 26 private-sector aerospace contractors have taken a major first step to coordinate the industry's education activities in supporting the nation's education reform efforts.

"The education of America's youth is far too important for just the government to solve. Industry has a vested interest in America's future and that future resides in the classrooms today," said Goldin. "I'm moved and overwhelmed with the variety of education programs and with the genuine concern and strong support of the aerospace industry in helping with national education reform. I hope that our joint initiative with the aerospace industry will be a model and an inspiration for other industries."

The 26 companies participating in the NASA-Industry Education Initiative (NIEI) reported conducting almost 600 education programs, with the majority (57 percent) of activities focused at the high school level. The hundreds of activities range from cooperating on and sponsoring PBS and other science education productions to awarding scholarships, conducting on-site teacher training programs to providing tutoring and mentoring programs. The education programs primarily emphasized science (55 percent), with the remainder emphasizing interdisciplinary studies.

The first step of the initiative was to survey existing education programs, produce an inventory and assess the level of program support for the national education goals.

The resulting ***NASA-Industry Education Initiative*** : ***Education Programs Report 1991*** provides a foundation for the next critical step of the initiative -- that is, to enhance government-industry cooperation, share information and leverage resources, and coordinate programs and reform efforts to help solve our nation's education problems.

- more -

The NASA-Industry Education Initiative Supports Education Reform

The NASA-Industry Education Initiative (NIEI) seeks ways in which NASA and the aerospace contractors can refine and align current and planned education activities to support the nation's education reform strategies and to accomplish the National Education Goals established by President Bush and the nation's Governors.

NASA and the aerospace industry's educational efforts reach several millions of Americans and involve well over 92,000 government and industry personnel annually. The industry supports a broad range of education programs at all grade levels, as well as with adults.

The initiative and its various education programs parallel the efforts of the Federal Coordinating Council for Science, Engineering and Technology's (FCCSET) Committee on Education and Human Resources (CEHR). The CEHR was created by the federal government for education coordination. Some of the objectives of both FCCSET/CEHR and NIEI are to improve science and mathematics performance, improve public understanding of science and technology, and to promote lifelong learning projects.

In keeping with the widely recognized need to increase the educational achievement of groups traditionally underrepresented in science and engineering, approximately 32 percent of NIEI programs are at least partly geared towards bringing and keeping minorities, females and people with disabilities into the educational pipeline.

NASA and the aerospace industry plan to update the NIEI report periodically to allow continued evaluation of the level and direction of NIEI education programs.

The 26 corporations participating in the NASA/Industry Education Initiative are Aerojet, Allied-Signal, BAMSI, Boeing, Computer Sciences, Cray Research, EG&G Florida, Fairchild Space, General Electric, Grumman, Honeywell, Hughes Aircraft, IBM, Johnson Controls, Lockheed, Loral, Martin Marietta, McDonnell Douglas, NSI Technology, Orbital Sciences, Rockwell International, Teledyne Brown, Thiokol, TRW, Unisys and United Technologies.

Copies of ***NASA-Industry Education Initiative : Education Programs Report 1991*** can be obtained from NASA Headquarters Newsroom and from the 26 participating corporations.

- end -

NASA News

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For Release
July 21, 1992

RELEASE: 92-119

NASA, NIH SIGN AGREEMENT ON JOINT, SPACE-RELATED RESEARCH

NASA Administrator Daniel S. Goldin and National Institutes of Health Director Bernadine Healy, M.D., today signed an agreement that will enhance each agency's biomedical research capabilities.

At a signing ceremony held with Senator Barbara Mikulski, the agencies pledged to develop programs that apply NASA's unique expertise to practical, medical needs on Earth and in space.

"For decades, the rigors of space flight have pushed NASA to advance the bounds of medical knowledge for the protection of our astronauts' health," Goldin said. "In so doing, the space program has spawned a host of technological advancements. Walk into any hospital today and you see the work of NASA -- programmable pacemakers, CAT scans, intensive care monitors, arthroscopic and laser surgery -- all derived from the space program."

Barbara Mikulski said, "For the first time in history we are linking up the considerable talents of both our NIH and our NASA research teams, and we are saying to them -- work together on what needs to be done both on Earth and in space. The joint NASA/NIH venture means that we will have twice the brainpower looking at diseases such as neurological disorders, arthritis and even cancer."

Dr. Healy said, "This memorandum of understanding provides the National Institutes of Health and NASA with a welcome opportunity to combine the unique strengths of both agencies in conducting research on the frontiers of space and medicine.

- more -

"NIH looks forward to what promises to be a productive exploration with NASA of the inner space of our bodies and cells and the outer space of our solar system and the universe," Dr. Healy said.

The agreement is intended to stimulate new opportunities in the biomedical and behavioral research community, as it provides for greater access to space as well as involvement by university-based research centers.

In general, the agreement calls for NIH to have the lead role in ground-based research activities and for NASA to have the lead role in space flight research activities.

Specifically addressed in the agreement are provisions for joint management and funding of programs that cover:

- Focused, university-based biomedical and behavioral research,

- Opportunities for space flight experiments to enable more biomedical and behavioral scientists to use the space environment for research,

- Grant supplements that allow NASA to fund awards to existing NIH research centers,

- Program announcements, requests for applications and requests for proposals to increase research tasks in selected areas of biomedical and behavioral research, and

- Mutually sponsored workshops and symposia on specific biomedical research topics.

Initial research topics likely to be addressed under the agreement include the neurovestibular system (vestibular and balance disorders and sensory motor function) and the musculoskeletal system (bone, muscle and related connective tissue).

Research performed by both agencies, under the agreement, would help us understand how these systems function in space crews and how mechanisms develop that lead to disease or dysfunction in patients on Earth.

- end -

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For Release
July 21, 1992

RELEASE: 92-120

ASTRONAUT HILMERS LEAVES NASA TO STUDY MEDICINE

Astronaut David C. Hilmers (Col., USMC) is leaving NASA in the fall and retiring from the U.S. Marine Corps November 1 to pursue a medical degree. Hilmers will attend the Baylor College of Medicine in Houston.

Hilmers has flown on four Space Shuttle missions, logging more than 493 hours in space. In September 1988, he served as a mission specialist on STS-26, the first flight to be flown after the Challenger accident, which deployed a Tracking and Data Relay Satellite.

More recently, Hilmers was a crew member on the STS-42 International Microgravity Laboratory-1 mission in January 1992, working on experiments in a broad spectrum of scientific disciplines provided by investigators from 11 countries. Two of the missions, STS-51J in October 1985 and STS-36 in February 1990, were Department of Defense flights.

Selected as an astronaut in 1980, Hilmers has served in a number of technical assignments, including work on upper stage vehicles, Shuttle software verification, astronaut office training coordinator, spacecraft communicator (CAPCOM), Space Station Freedom issues and Head of the Mission Development Branch within the Astronaut Office.

"As I leave NASA, I reflect on 12 years filled with grand experiences, great joy and occasional sorrow. Above all else, I will miss my co-workers in the space program who stood by me throughout, and whose efforts were responsible for anything I might have achieved. At this time, I feel that I have been assigned to a new mission in the field of medicine, and my hope is that my service to others would someday approach the support I have enjoyed here," Hilmers said.

- more -

"Dave is a brilliant and totally unselfish person. I'm sure he will be successful in his new career as a doctor. His aspiration to new goals typifies the intrinsic striving to explore new horizons and to accept new challenges that made him an outstanding astronaut and an asset to the space program," Donald R. Puddy, Director of Flight Crew Operations, said.

- end -

NASA News

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For Release

July 21, 1992

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RELEASE: 92-121

NASA ADMINISTRATOR GOLDIN TO TAKE PART IN EAA CONVENTION

NASA Administrator Daniel S. Goldin will take part in several activities at this year's Experimental Aircraft Association (EAA) Fly-In convention at Oshkosh, Wis. -- the nation's largest airshow.

Goldin's appearance will mark the first time a NASA Administrator has attended the annual event, which will run from July 31 through Aug. 6 at Wittman Regional Airport.

At 3 p.m. EDT on Aug. 1, Goldin will hold a news conference at the NASA Pavilion. Goldin also will speak about NASA's aeronautics priorities at a special evening program honoring the 75th anniversary of NASA's Langley Research Center, Hampton, Va.

"The NASA pavilion is a favorite of the nearly 1 million visitors who come to Oshkosh each year," Goldin said. "With its emphasis on explaining not only the 'what" but the 'why' of our research, the 1992 exhibit shows the public just how important our efforts are to the nation, especially in aeronautics."

- more -

This year's exhibit, entitled Exploring New Worlds of Flight, highlights the new discoveries that NASA is making in its aeronautics and space programs. It shows how NASA research helps keep the U.S. industry internationally competitive and create a better life for the average U.S. citizen.

At the entrance to the NASA pavilion is a striking 50-foot-long mockup of the X-30 National Aero-Space Plane (NASP), built by Mississippi State University students, symbolizing the bold new designs that are turning today's ideas into tomorrow's technology.

Inside, visitors will see how the building blocks of the NASP program are coming together to make the X-30's voyages of discovery possible. The exhibit also focuses on NASA's work to lay the foundation for a next-generation American supersonic transport, which will be vital to future U.S. competitiveness in the world aviation market.

The displays on NASA's role in a new presidential initiative, called the High Performance Computing and Communications Program, will give a feeling for what life will be like with computers many times faster than today's machines. The National Assets exhibit showcases NASA's unique research tools, including its "air force" of research planes from the original Boeing-737 to the Mach 3-plus SR-71 Blackbirds.

-end-

NOTE TO EDITORS: To reach a NASA Public Affairs representative during the airshow, call 414/235-5424

NASA News

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AC 202 453-8400

ISY

Terri Sindelar
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

For Release

July 22, 1992

RELEASE: 92-122

SPACE GRANT COLLEGES EXPAND NATIONWIDE

NASA Administrator Daniel S. Goldin announced a major milestone for aerospace education by expanding the National Space Grant College and Fellowship Program to include all 50 states, the District of Columbia and Puerto Rico.

"Today marks the completion as well as a beginning to one of NASA's largest education initiatives. The five new members of the Space Grant College program represent a goal to have a nationwide network of universities conducting aerospace studies," said Goldin. "The consortia will have a very significant impact on strengthening aerospace research infrastructures and in educating our future scientists and engineers."

The addition of Kentucky, Nebraska, Puerto Rico, Vermont and Wyoming, along with their 26 colleges and universities, brings the total number of participating institutions to more than 320 nationwide.

The Space Grant Program offers states the opportunity to receive grants to further projects in aeronautics, space and related fields. The states will receive an initial 3-year grant of at least $150,000 per year to implement programs aimed at strengthening their research capabilities in aerospace and related science, engineering and technology. A portion of the grant is for fellowships to promising undergraduate and graduate students, with emphasis on recruiting and retaining women, underrepresented minorities and the disabled in the aerospace fields.

Authorized by Congress in 1987, the National Space Grant College and Fellowship Program has been building state membership since 1989. The objectives are to establish a national network of universities with interests and capabilities in aeronautics, space and related fields; to encourage cooperative programs among universities, aerospace industry and federal, state and local governments; to encourage interdisciplinary training, research and public-service programs related to aerospace; to recruit and train professionals, especially women, underrepresented minorities and persons with disabilities, for careers in aerospace science and technology; and to promote a strong science, math and technology education base from elementary through university levels.

- end -

Subj: HQ N92-65 GOLDIN SPEECH (CORRECTED)

FOR IMMEDIATE RELEASE

Bill Livingstone
Headquarters, Washington, D.C.
(Phone: 202/453-1898)

July 23, 1992

EDITORS NOTE: N92-65

GOLDIN CALLS FOR NASA PROCUREMENT REFORM

In a major speech to be delivered in Los Angeles before the National Contractor Managers Association, NASA Administrator Daniel S. Goldin will outline plans for major reform within the NASA procurement system.

The speech will be given at 8:15 a.m. PDT, Friday, July 24, at the Los Angeles Airport Hotel, Century Boulevard. Following the speech, at approximately 9 a.m. PDT, Goldin will be available to meet with the press.

-end-

Posted: Thu, Jul 23, 1992 2:48 PM EDT Msg: JJJC-3024-6724
From: PAO.KSC
To: P, PF, PAOLOOP.NASAMAIL,
(C:USA,ADMD:TELEMAIL,PRMD:GSFC,O:GSFCMAIL,UN:PUBINFO),
(SN:<JPLPIO.PAOLOOP AT JPLPOST>,O:CCMGW,SITE:JPL),
(SITE:INTERNET,ID:<PAOLOOP(a)JPLPOST.JPL.NASA.GOV>),
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Mark Hess
Headquarters, Washington, D.C.
(Phone: 202/453-4164)

Jim Sahli/Dom Amatore
Marshall Space Flight Center, Huntsville, Ala.
(Phone: 205/544-0034)

For Release

July 24, 1992

RELEASE: C92-9

CRAY GRUMMAN SELECTED FOR FINAL CONTRACT NEGOTIATIONS

NASA's Marshall Space Flight Center (MSFC), Huntsville, Ala., announced today that Cray Grumman Systems, Huntsville, Ala., has been selected for final negotiations leading to the award of a contract for Engineering Analysis and Data Systems II (EADS II) for the center's Science and Engineering Directorate.

Marshall officials anticipate that a firm-fixed price, lease-with-option-to-purchase type contract will be awarded for 1 year with seven 1-year options for a total of 8 years. Optional hardware upgrades are permitted during the first 5 years of the contract. During the final 3 years, only maintenance upgrades are permitted. The total contract value is approximately $129,000,000.

Cray Grumman Systems will provide the management, personnel, equipment, services, supplies, facilities and materials required to manage, upgrade and maintain the EADS II at the Marshall Space Fight Center.

The EADS II computational system will include network controllers, front-end processors, high capacity mass storage, peripherals, high-speed networks, distributed mini-super vector processors, high-speed large-scale vectorized code processors, high-speed scientific workstations, operating systems software, systems and network management software, software development tools, and applications software to provide computational resources for projects at Marshall.

The integrated system will be used for scientific and engineering computations in support of Marshall programs with emphasis on analysis of thermal, electrical, loads and structural design characteristics that influence flight vehicle and payload performance.

- end -

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For Release

Bill Livingstone
Headquarters, Washington, D.C.
(Phone: 202/453-1898)

July 24, 1992

RELEASE 92-123

GOLDIN OUTLINES NASA PROCUREMENT REFORM

NASA Administrator Daniel S. Goldin today announced a series of procurement reforms to make NASA the model of excellence for the Federal Government and ensure Americans receive the very best value for their tax dollar.

"Through a focus on the customer, empowerment, teamwork with our partners in industry, accountability and diversity, we can achieve our goal and serve as a beacon to others," Goldin said in a speech to the National Contract Management Association in Los Angeles.

Goldin said reforms in NASA's procurement process are necessary because 90 percent of its budget is spent through contracts.

"We must continue to give the American people technical advances, but we must also give them 'best' value for their tax dollar," Goldin said.

"In the future, NASA will not tolerate 300 percent cost overruns, defective spacecraft hardware or the failure to follow work instructions that protect government furnished hardware," Goldin said.

"Nor will we tolerate schedule slippages," Goldin said. "We can't keep letting months turn into years and years into decades."

According to Goldin, the current procurement system teaches people to fear making any mistake.

"Everyone involved in the acquisition process is swimming in certifications," Goldin said. "Instead, we should be encouraging innovation, creativity and efficiency."

- more -

Goldin said NASA and contractor personnel will never achieve excellence if they are not given clear lines of responsibility and held accountable for their decisions.

Major changes in the procurement process include:

o New contracts will be awarded to companies that have demonstrated they are accountable by delivering quality systems that meet cost schedule and technical requirements; and

o The amount of the award fee earned will be determined by the end result, namely the quality, timeliness and cost of what is delivered;

o Contractors will be given greater responsibility for success of a program, and should be given the opportunity for increased award fee if they hold to schedule, keep the program within cost estimates and deliver a satisfactory product.

Total Quality Management

To determine contractor performance, Goldin said NASA will soon establish a joint NASA-Industry team to develop a source of "metrics" or measurements.

"Once the metrics are established, NASA will publish the results on a generic basis, without identifying specific contractors. On a semi-annual basis, we will notify each CEO where their company stands," Goldin said.

Cultural Diversity

Finally, Goldin said NASA will aggressively promote cultural diversity in the work place and to reaching its goal for Small and Disadvantaged Business (SDB) contracts.

"As Administrator of NASA, I have made a personal commitment to increasing cultural diversity in the workplace and to increasing the contracting opportunities for small and disadvantaged contracts," Goldin said.

Goldin said NASA had implemented a range of initiatives to increase the number of SDB contracts, including:

o SDB considerations are part of NASA's earliest procurement planning, and are emphasized in acquisition strategy meetings or in procurement plans; and

o In many of NASA's large prime contracts, NASA is establishing firm percentages of the effort to be subcontracted to SDBs and will reward those contractors with special incentive fees when they exceed the SDB requirement.

"Small and disadvantaged businesses need assistance above and beyond set-asides," Goldin said.

"In the coming months we will be setting up a new 'minority business resource advisory committee' in NASA to help us bring more SDB contractors into the NASA family," Goldin said.

"Each of us as professionals and as citizens has an obligation to help overcome the barriers that divide us as a nation," Goldin said.

"The Los Angeles riots were visual proof that we must redouble our efforts to help our minority citizens turn their dreams into realities," Goldin said.

- end -

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For Release

Bill Livingstone
Headquarters, Washington, D.C.
(Phone: 202/453-1898)

July 27, 1992

RELEASE 92-123A

NASA TO EMPHASIZE CULTURAL DIVERSITY IN PROCUREMENT

NASA will aggressively promote cultural diversity in the work place and in pursuit of contract goals for small and disadvantaged businesses, Administrator Daniel S. Goldin has declared in a major address on procurement policy reform.

"As Adminstrator of NASA, I have made a personal commitment to increasing cultural diversity in the workplace and to increasing the contracting opportunities for small and disadvantaged contractors," Goldin told the National Contract Management Association in Los Angeles July 24.

In his address, Goldin announced a series of procurement reforms designed to make NASA a model of excellence for the federal government and to ensure that the public receives the very best value for its tax dollars.

The NASA Administrator said the agency had implemented a range of initiatives to increase the number of contracts flowing to small and disadvantaged businesses(SDB), including:

o Emphasis on SDB considerations in the earliest part of procurement planning, with continuing emphasis in acquisition strategy meetings and other procurement activity.

o Establishment by NASA of firm percentages of large prime contracts to be subcontracted to SDBs, with reward of special incentive fees to prime contractors when they exceed the SBD requirement.

-more-

"Small and disadvantaged businesses need assistance above and beyond set-asides," Goldin said.

"In the coming months, we will be setting up a new 'minority business resource advisory committee' in NASA to help us bring more SDB contractors into the NASA family", Goldin said.

"Each of us as professionals and as citizens has an obligation to help overcome the barriers that divide us as a nation. The Los Angeles riots were visual proof that we must redouble our efforts to help minority citizens turn their dreams into realities," Goldin said.

Discussing the procurement reform effort, Goldin said that NASA "must continue to give the American people technical advances, but we must also give them 'best' value for their tax dollar.

"In the future, NASA will not tolerate 300 percent cost overruns, defective spacecraft hardware or the failure to follow work instructions that protect government furnished hardware," Goldin said.

"Nor will we tolerate schedule slippages. We can't keep letting months turn into years and years into decades," Goldin said.

The major changes in the procurement process include:

o Awarding new contracts to companies that have demonstrated that they are accountable by delivering quality systems that meet cost schedules and technical requirement.

o Determining award fees by the end result, namely the quality, timeliness and cost of what is delivered.

o Giving contractors greater responsibility for success of a program, including opportunity for increased award fees if they hold to a schedule, keep the progam within cost estimates and deliver a satisfactory product.

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Paula Cleggett-Haleim
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

July 24, 1992

Jane Hutchison
Ames Research Center, Moffett Field, Calif.
(Phone: 415/604-4968)

RELEASE: 92-124

MISSION RESULTS: HOW LIFE ADAPTS TO SPACE

Human, plant and animal cells exposed to the microgravity of space for only a few days show changes in function and structure, according to NASA scientists.

Although preliminary, the results of the recent life sciences research on the space shuttle suggest alterations in metabolism, immune cell function, cell division and cell attachment.

"This type of research is important not only in helping us understand how life adapts to the weightlessness of space, but also in increasing our knowledge of basic cell function and thus contribute to the well-being of life on Earth," said Dr. Thora Halstead, Manager of NASA's Space Biology Program.

Dr. Gerald Sonnenfeld of the University of Louisville, Kentucky, reports that after nine days in space, human immune cells failed to differentiate into mature effector cells. The results of his investigation into how the stress of space flight affects immune system cells suggest that the stress of space flight can alter normal metabolic activities and important aspects of immune cell function.

"The failure of the body to produce mature, fully differentiated cells in space may lead to health problems, including impaired healing abilities and increased risk of infection," he said.

- more -

"Bone-forming cells exposed to microgravity also show changes," said Dr. Emily Morey-Holton of NASA's Ames Research Center, Moffett Field, Calif. Her study of how exposure to microgravity changes the size, shape and cellular components of rat bone cells revealed a significant number of floating, dead bone-forming cells.

"Bone cells die if they can't attach to something," Morey-Holton said. "That we found so many unattached, dead cells may indicate that gravity is required to show the cells where to attach. This finding could be significant since many biological processes, both in single cells and in multicelled organisms, depend on cell attachment and recognition processes."

She added that the attached bone cells, although healthy, showed no signs of producing mineral. "It may be that bone cells don't need to form mineral to support themselves in microgravity," she said.

Morey-Holton and Sonnenfeld both used a novel computerized cell culture incubator (the Space Tissue Loss Module) to keep their cultures alive. The module, developed by Dr. William Weismann of the Walter Reed Army Institute of Research in Washington, D.C., was designed specifically for studying the metabolic activities of cells in space.

"The successful operation of the STL Module signified a landmark technological achievement in our ability to study cell functions during space flight," Halstead said.

Plant cells also respond to microgravity, according to Dr. Abraham Krikorian of the State University of New York at Stony Brook. "There is increasing evidence that cells in the roots of plants subjected to space flight undergo major changes in their cell division profile, even after as few as four days in space," he said.

"One particularly important consideration is that cells be able to divide efficiently and to partition their genetic information with high fidelity," he said. "In short, they have to get their signals straight and to process them accurately."

He noted that in one plant (Haplopappus gracilis) that has only four chromosomes, overall root production was significantly faster under space flight conditions. He also said that changes in chromosomes were found in up to one-third of the cells that flew in space.

Dr. Pauline J. Duke of the University of Texas Health Science Center in Houston also found differences between mouse bone cells developed in space and on the ground. She said the cells in microgravity showed changes in attachment.

"The surfaces of flight cells were smoother than those of ground-based controls, indicating that matrix production or secretion is altered during space flight, probably as a direct result of microgravity exposure," she said. "Matrix forms the basic structure of bone."

Dukes experiment, the first culture of skeletal cells in space, was designed to determine whether cells sensitive to gravitational changes in the whole animal and in organ culture retained that sensitivity in cell culture.

Although Halstead is pleased with the results of these studies, she said there is still much to learn. "We are just beginning to understand how cells function in space," she said.

"A more thorough understanding will come only after much more research. We are looking to Space Station Freedom to give us the opportunities to conduct the long-term studies that ultimately may hold the key to this basic component of life," she said.

The results of these studies will be reported Monday, July 27, 1992, at a workshop on Cellular Response to Microgravity as part of the Fifth International Congress on Cell Biology in Madrid, Spain.

- end -

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Paula Cleggett-Haleim
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

For Release
July 24, 1992

RELEASE: 92-125

UNEXPECTED RESULTS FROM LIFE SCIENCES MISSION

Scientists report dramatic changes from space travel in some of the body's systems, with a resiliency in others -- all of which affect long stays in space and medical research on Earth. These results are from the Spacelab Life Sciences-1 (SLS-1) mission, flown aboard Space Shuttle Columbia in June 1991.

"Taken together, these results show the need for a laboratory in space to complement the traditional laboratory on Earth. This is vital in understanding how the human body works, whether it is in space or on Earth," says Dr. Ronald White, chief scientist of NASA's Life Sciences Division.

Four principal investigators from the SLS-1 mission report key findings in the areas of cardiovascular (heart and lungs), musculoskeletal (muscles and bones) and neurovestibular (inner ear/brain) physiology.

CARDIOVASCULAR

Space travel presents a drastic change in working conditions to the heart and lungs, according to Dr. C. Gunnar Blomqvist, a cardiologist from the University of Texas Health Science Center in Dallas.

Often astronauts just returning from space have difficulty maintaining normal blood pressure and blood flow when standing. One SLS-1 experiment using a catheter inserted preflight into an arm vein of an astronaut and later moved nearer to the heart shows the astronaut experienced much more rapid fall in central blood pressure than was predicted.

In another area of cardiovascular research, it was found that exposure to space impairs an astronaut's pressure regulating reflexes, called baroreflexes, according to Dr. Dwain L. Eckberg of the Hunter Holmes McGurie Department of Veterans Affairs Medical Center and the Medical College of Virginia,.

A closely fitting neck collar (similar to a whip-lash collar) was used on astronauts during the SLS-1 mission to record two blood pressure sensing areas located in the neck.

- more -

By the eighth day of flight, astronauts had significantly faster resting heart rates, less maximum change of heart rate per unit of neck pressure change and a smaller range of heart rate responses. These changes occurred in all astronauts studied. The changes that developed were large and statistically significant.

These results validated findings obtained on Earth. They were based on predictions that Dr. Eckberg made by studying subjects after prolonged bedrest.

This validation can lead to important studies in clinical medicine because studying astronauts before and after flight or by studying healthy people before and after bedrest, provide insights into medical problems here on Earth.

Nervous System

In another SLS-1 experiment, there is clear evidence that the number of structures (synapses) used to communicate between the cells of the inner ear's gravity detecting organ and the central nervous system increase greatly during space flight, but not in size. Therefore, these systems should be able to adapt to the differing gravitational environments of space, the moon and Mars, according to Dr. Muriel D. Ross, a neuroanatomist from NASA's Ames Research Center, Moffett Field, Calif.

Further research in this area should also shed light on the broader topics of memory and learning in neural tissue and on clinical diseases of the inner ear.

Muscles

Following space flight, there is a significant and dramatic reduction in the size of all muscles needed for standing and moving, according to Dr. Kenneth M. Baldwin, an exercise and muscle physiologist from the College of Medicine at the University of California, Irvine.

"Also, there is a reduced capacity of muscles to burn fat for energy production," says Dr. Baldwin. "In addition, this experiment has verified that muscles that suport the body when we walk around on Earth change their nature in space because they are not needed."

Taken together, these findings suggest that properties of the skeletal muscle system, the largest organ system of the body, are greatly altered during space flight.

-end-

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Ed Campion
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

For Release
July 27, 1992

EDITORS NOTE: N92-66

STS-46 NASA NEWSROOM HOURS AND PROCEDURES

During Space Shuttle mission STS-46, the NASA newsrooms supporting the flight will have extended hours of operation. However, staffing and budget constraints will force some NASA newsrooms to be closed in the evenings and on weekends.

To permit media to ask questions in daily mission press briefings, the following procedures are to be used when a newsroom is closed, and it is not possible for the media to ask questions directly of press conference briefers.

Media should write down their name, affiliation and question(s) and facsimile the question(s) to the newsroom at the NASA center originating the briefing at least 1/2 hour prior to the start of the news conference. Facsimile numbers are listed in this announcement. The question(s) will be given to the appropriate briefer who will read the question over NASA select and answer it or refer it to the appropriate expert. Newsroom personnel WILL NOT forward verbal questions to the briefing participants.

In an effort to facilitate the flow of communications, listed below are the times each newsroom will be open along with contact phone numbers.

STS-46 NEWSROOM OPERATIONS (Based on 7/31/92 launch)

Kennedy Space Center, Fla.

Operating Hours	
L-2	7:00 a.m. - 6:00 p.m. EDT
L-1	7:00 a.m. -
Launch day	- 6:00 p.m. EDT
On-Orbit (weekdays)	7:00 a.m. - flight briefings - Call for hours
On-Orbit (weekends)	Open for flight briefings - Call for hours
Landing day	7:00 a.m. - 6:00 p.m. EDT

- more -

Phone Numbers
Newsroom: 407/867-2468
Facsimile: 407/867-2692
Code-A-Phone: 407/867-2525

After Hours:
Dick Young - 407/452-5141
Karl Kristofferson - 407/267-9302

Johnson Space Center, Houston

Operating Hours
L-2 8:00 a.m. - 5:00 p.m. CDT
L-1 8:00 a.m. - 5:00 p.m. CDT
Launch day 6:00 a.m. - CDT
On-Orbit (weekdays) Open 24 hours
On-Orbit (weekends) Open 24 hours
Landing day - 5:00 p.m. CDT

Phone Numbers
Newsroom: 713/483-5111
Facsimile: 713/483-2000
Code-A-Phone: 713/483-8600

After Hours: Not needed. Newsroom open 24 hours during STS-46

Marshall Space Flight Center, Huntsville, Ala.

Operating Hours
L-2 8:00 a.m. - 5:00 p.m. CDT
L-1 8:00 a.m. - 5:00 p.m. CDT
Launch day 8:00 a.m. - 5:00 p.m CDT
On-Orbit (weekdays) 8:00 a.m. - 5:00 p.m. CDT
On-Orbit (weekends) Closed
Landing day 8:00 a.m. - 5:00 p.m. CDT

Phone Numbers
Newsroom: 205/544-0034
Facsimile: 205/544-5852
Code-A-Phone: 205/544-6397

After Hours:
Dom Amatore - 205/461-7833
Jim Sahli - 205/922-9495

Dryden Flight Research Facility, Edwards, Calif.

Operating Hours	
L-2	7:30 a.m. - 4:00 p.m. PDT
L-1	7:30 a.m. - 4:00 p.m. PDT
Launch day	6:00 a.m. - 4:00 p.m. PDT
On-Orbit (weekdays)	7:30 a.m. - 4:00 p.m. PDT
On-Orbit (weekends)	Closed
Landing day	Landing - 2 hours - Landing + 4 hours PDT

Phone Numbers	
Newsroom:	805/258-3449
Facsimile:	805/258-3566
Code-A-Phone:	805/258-2564

After Hours:
Nancy Lovato - 805/948-2957
Don Haley - 805/943-5817

- end -

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For Release

Mark Hess
Headquarters, Washington, D.C.
(Phone: 202/453-4164)

July 27, 1992

Barry Epstein
Headquarters, Washington, D.C.
(Phone: 202/453-8203)

NOTE TO EDITORS: N92-67

SPACE STATION UTILIZATION CONFERENCE OPEN TO MEDIA

The first NASA-sponsored Space Station Freedom Utilization Conference, to be held Aug. 3-6 in Huntsville, Ala., is open to media coverage. The conference is being held at the Von Braun Civic Center. Registration will begin at 7:30 a.m. CDT on Aug. 3, and the program will begin at noon.

Among those scheduled to speak at the conference are NASA Administrator Daniel Goldin and Bonnie Dunbar and Larry DeLucas, two of the crew members on the recent record-breaking STS-50 Space Shuttle mission.

The conference is being held to inform potential researchers about Freedom's capabilities, plans and opportunities for research and to provide a forum for the exchange of information between space station program managers and potential space station users.

The speakers and exhibits will cover the status of Freedom's development, the procedure for getting payloads aboard and current space station research objectives, plans and facilities.

Experienced space researchers will share results from past investigations on Spacelab and describe their plans for research aboard the space station. Three discipline splinter sessions will cover life sciences research, technology research and mircrogravity research.

In addition to the presentations, tours of the full-scale space station engineering mockups at the Marshall Space Flight Center can be arranged. Other space station hardware and exhibits will be on display at the civic center throughout the conference.

Conference fees have been waived for media with press credentials. To register for the conference, contact Linda Billings at 202/863-8406. For more information or a detailed agenda, contact Billings or one of the names listed on this editor's note.

- end -

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Brian Dunbar
Headquarters, Washington, D.C.
(Phone: 202/358-0873)

For Release

July 27, 1992

NOTE TO EDITORS: N92-68

BRIEFING ON NEXT MISSION TO PLANET EARTH SATELLITE SET

NASA and the Centre Nationale d'Etudes Spatiales (CNES), the French space agency, will hold a mission briefing on the TOPEX/POSEIDON satellite at 1 p.m. EDT, Wed., July 29, at the NASA Headquarters Auditorium (room 6104, 400 Maryland Ave., S.W., Washington, D.C.).

TOPEX/POSEIDON is a U.S.-French mission to map ocean circulation and better understand its role in regulating global climate. TOPEX/POSEIDON is the second major satellite element of NASA's Mission to Planet Earth, a coordinated research effort to study the Earth as a global environmental system. The satellite is scheduled for launch from Kourou, French Guiana, aboard an Ariane 42P launch vehicle at 7:08 p.m. EDT, Aug. 10.

The briefing panel will include Dr. William Patzert, NASA Program Scientist, NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif.; Linwood Jones, NASA Program Manager, NASA Headquarters; Charles Yamarone, Project Manager, JPL; and Michel Dorrer, CNES Program Manager.

A video on TOPEX/POSEIDON will be shown at the briefing and copies will be available to media representatives.

The briefing will be carried live on NASA Select television, SatCom F2R, 72 degrees west longitude, frequency 3954.5 MHz vertical polarization, audio frequency 6.8 MHz. Questions will be taken from reporters at NASA centers.

- end -

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Ed Campion
Headquarters, Washington, D.C.
(Phone: 202/453-1134)

Karl Kristofferson
Kennedy Space Center, Fla.
(Phone: 407/867-2468)

For Release

July 28, 1992

RELEASE: C92-10

PIONEERING PERSONAL COMPUTER ACQUISITION CONTRACTS AWARDED

Kennedy Space Center, Fla., has awarded first-of-a-kind contracts to three firms under NASA's Personal Computer Acquisition Contract program. Throughout the 5-year life of the contracts, the three companies must compete against each other for NASA orders to supply personal computer (PC) hardware and software to Kennedy Space Center and other NASA locations.

The companies are General Technology, Inc., Costa Mesa, Calif.; Atlanta Technologies, Inc., Atlanta, Ga.; and International Data Products Corp., Gaithersburg, Md. The contract period of performance is from July 2, 1992 to July 1, 1994, with three additional 1-year optional periods.

Under the terms of the fixed price contract, all three companies will receive portions of a $37,674,000 award, with a minimum amount of $180,000 going to each firm. The actual purchases of PC hardware and software depend on which small business company is able to provide the lowest prices and best performance during a quarterly time period.

Although vendors may renegotiate current prices every 3 months, they cannot increase prices above the contract negotiated prices and they must furnish current technology items. NASA has established this competitive arrangement so that the agency can be assured of a steady supply of high-quality products for the best price.

Kennedy Space Center is the primary launch and landing site for the Space Shuttle. The computers and software purchased under this contract will be used in a variety of technical and administrative support functions. Other NASA centers and organizations also may order PC equipment and software through the KSC-managed contract.

- end -

Independent Agencies bill. Please stay tuned.

Posted: Wed, Jul 29, 1992 1:41 PM EDT Msg: SJJC-3025-6307
From: HQNEWSROOM
To: P, PAOLOOP.NASAMAIL,
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Subj: HQNTE92-69/GOLDIN STATION VOTE CONFERENCE

David W. Garrett
Headquarters, Washington, D.C. July 29, 1992
(Phone: 202/453-8400)

N92-69
NOTE TO EDITORS

GOLDIN TO MEET PRESS AFTER HOUSE VOTE TODAY

Following today's vote on the NASA budget, NASA Administrator Daniel S. Goldin will join several members of the House of Representatives to discuss the results of the vote with the media. The location is the House Triangle at the east front of the Capitol, House side.

-end-

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 453-8400

ISY

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For Release July 31, 1992

RELEASE: 92-127

HST TO RESUME NORMAL OPERATION AFTER BRIEF DELAY

While recovering from a benign standby condition, which began late Wednesday night, NASA's Hubble Space Telescope (HST) entered a deeper safe condition on Thursday night. A plan for resuming normal operations will be developed over the next several days.

Currently, the cause of both conditions, or safe modes, are understood and can be fixed promptly. Spacecraft managers, however, are now analyzing all related data before sending HST new computer commands that would resume science data collection.

The project director, Joe Rothenberg, said, "The system operated exactly as designed."

Safe modes are a capability built into all NASA spacecraft. They are invaluable "safety nets" to protect against spacecraft anomalies caused by on-orbit hardware problems or erroneous commands sent from the ground.

On Wednesday at 11:49 p.m., EDT, HST went into a standby condition, called an "inertial hold mode." This condition was caused by some erroneous data contained in a standard ephemeris uplink. The ephemeris tells where the spacecraft will be at certain time. Such uplinks occur routinely to update stored data contained in the HST flight computer.

Hubble's safety checking system detected the error and entered this hold condition until spacecraft controllers could fix the problem. The recovery process from this type of hold should take about 36 hours.

- more -

While recovering from that inertial hold, another problem occurred that caused HST to enter a deeper, "hardware safe mode." Revised software loaded on board Hubble's flight computer in May 1992 contained an error, which caused it to enter this type of safe mode.

Currently, spacecraft controllers are further analyzing and testing spacecraft data to develop an appropriate recovery plan.

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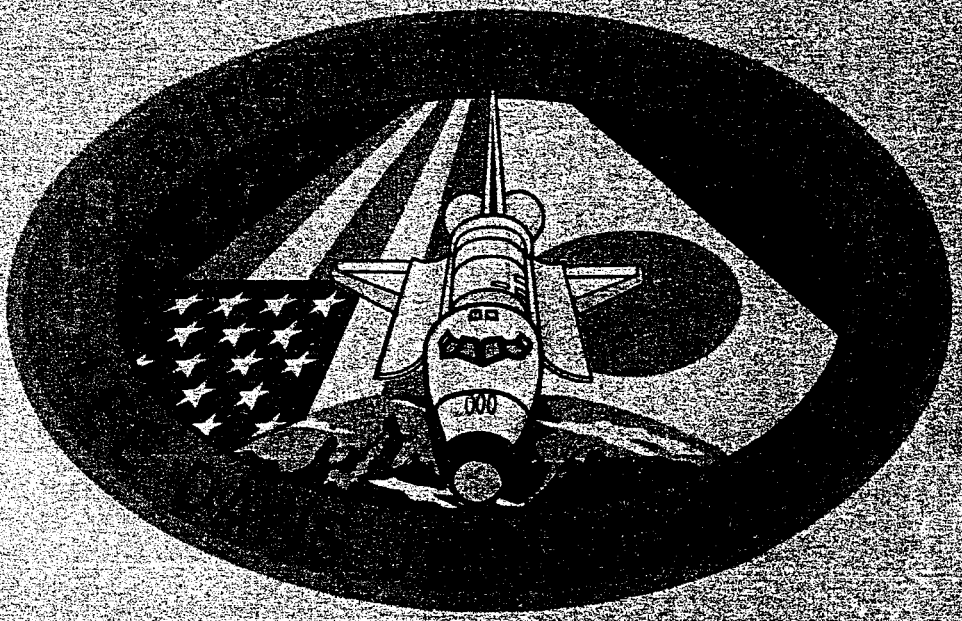
92-128

NASA
SPACE SHUTTLE MISSION
SPACELAB J

STS-47 PRESS KIT



SEPTEMBER 1992

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CONTENTS

RELEASE: 92-128 September 1992

STS-47 FLIGHT MARKS JAPAN'S MAJOR FORAY INTO HUMAN SPACEFLIGHT

The 50th Shuttle flight marks the first NASA mission devoted primarily to Japan. Space Shuttle Endeavour will carry a crew of 7, including a Japanese mission specialist, and Spacelab-J (SL-J) science laboratory into Earth orbit on the STS-47 mission. SL-J contains 43 experiments, 34 provided by Japan, 7 from the United States and 2 joint experiments.

"Missions such as Spacelab J mirrow the way science is done on Earth," said SL-J Program Scientist Dr. Robert S. Sokolowski. "Astronauts aboard the orbiting laboratory will conduct experiments around-the-clock. These experiments will add to basic knowledge about the behavior of everything from crystals, fluids and even humans when exposed to the near weightless environment of spaceflight."

Commander of the mission is Robert "Hoot" Gibson, making his fourth Shuttle flight. Curtis Brown, making his first, is the pilot. Making their second Shuttle flights are mission specialists Mark Lee and Jay Apt. First time space travelers Jan Davis and Mae Jemison, the first African American woman to fly in space, round out the NASA crew.

Endeavour's crew also will include the first Japanese to fly aboard a NASA spacecraft, payload specialist Dr. Mamoru Mohri.

STS-47 will be the second flight of NASA's newest Space Shuttle, Endeavour. Scheduled for launch around Sept. 11, the mission is scheduled to last 6 days, 20 hours and 36 minutes. At the end of its mission, Endeavour will land at the Kennedy Space Center, Fla.

SL-J Laboratory

Spacelab is a 23-foot long pressurized laboratory built by the European Space Agency specifically for conducting experiments in a shirt-sleeve environment aboard the Space Shuttle.

"On Spacelab missions, astronauts do the science. They have an essential role in the conduct of the experiments, both as investigators and as test subjects," said Gary W. McCollum, SL-J Program Manager. "This mission is ty;pical of how we will routinely work in space for much longer periods when Space Station Freedom begins operations later this decade."

Research conducted on Spacelab missions and later on Freedom offers unique opportunities to learn about basic scientific processes, which ultimately may lead to useful commercial and medical applications.

But, the effects of microgravity on plants and animals, including humans, must be understood before long-term space travel and exploration missions can be undertaken.

"Our life sciences research seeks to distinguish the role gravity plays in the development and functions of life on Earth. We can study plants and animals -- including humans -- in the microgravity of space," said Dr. Thora Halstead, SL-J Program Scientist. "With the overwhelming influence of gravity removed, basic physical processes can be studied more easily."

"This information is critical to keeping people healthy and productive on the space station and on long space missions to the planets," Halstead said. "But the application of this knowledge has far-reaching benefits because some of what we learn on these missions will be useful to researchers studying medical problems on Earth."

Materials Science Experiments

On Spacelab J, 24 experiments will study various materials and processes in the near absence of gravity. This includes studies of protein crystals, electronic materials, fluids, glasses and ceramics, metals and alloys --

A frequent flier on Space Shuttle missions, the protein crystal growth experiment will make its 15th trip into space. Proteins are building blocks of living organisms. Understanding how proteins work could lead to new and improved medicines and foods.

Due to the forces of gravity, the internal structures of protein crystals grow imperfectly on Earth. Absent of gravity-induced flaws, the internal structure of protein crystals grown in space can be studied on the ground more easily .

Returned to Earth and examined using powerful x-ray diffractometers and computers, these space-grown protein crystals reveal their molecular structure. Understanding how proteins work could lead to new and improved medicines and protein-rich foods.

Semiconductors, an integral component of electronic devices used in industrial and consumer products, are the focus of several materials experiments. Six types of semiconductor crystals will be grown aboard Spacelab.

In the miniature world of semiconductor chips, gravity-induced flaws in crystals can alter dramatically the performance of the chip. With no gravity, researchers believe they can grow crystals of unparalleled quality and consistency. This could eventually lead to improved semiconductors and superconductors and more efficient electronic components.

Endeavour's crew also will conduct investigations on the behavior of mineral oil drops. This is part of a continuing effort to identify the potential for processing materials without the need for containers that, like gravity, reduces the quality of the material processed.

Other experiments will manufacture glass and a rare mineral compound called samarskite, which will test theories on material properties. A series of 10 metals and alloys experiments will look into the ways that ingredients may be combined to form new, improved materials.

Life Sciences Experiments

The remaining 20 experiments are life science research. Life science experiments include cell separation, cell biology, developmental biology, animal and human physiology and behavior, space radiation and biological rhythms.

Astronauts will separate mixtures of proteins using an electrical field as a way of obtaining purer proteins. They will grow plant and animal cells to see how microgravity alters their development and to learn more about how they function.

Frog eggs will be fertilized in space and examined at various stages of development -- from embryos to tadpoles to adults. The influence of weightlessness on the stages of development and the behavior of the frogs will be determined. Chicken embryos also will be flown to study how space flight alters the development of bones and other tissues.

Scientists will study the human body's motion and balance mechanisms and visual stability as altered by space flight. Endeavour's crew will be the test subjects.

They also will participate in experiments to test the effectiveness of biofeedback to ward off space motion sickness. Magnetic Resonance Imaging (MRI) equipment will be used pre- and post-flight to measure muscle and bone loss due to space travel.

A Japanese experiment will use two koi fish (carp) to study effects of weightlessness on a fish's gravity-sensing organ, which is very similar to the same organ in humans. Effects of space cosmic radiation will be measured using fruit fly larvae and eggs.

A new piece of medical equipment to convert contaminated water into a sterile (glucose and saline) fluid for intravenous use will be tested. This experiment is directed toward future medical care on Space Station Freedom.

Several other experiments will be carried in the Shuttle middeck compartment. Also a Getaway Special Bridge in the cargo bay will house 9 experiments.

- end -

MEDIA SERVICES INFORMATION

NASA Select Television Transmission

NASA Select television is available on Satcom F-2R, Transponder 13, located at 72 degrees west longitude; frequency 3960.0 MHz, audio 6.8 MHz.

The schedule for television transmissions from the Space Shuttle orbiter and for the mission briefings will be available during the mission at Kennedy Space Center, Fla; Marshall Space Flight Center, Huntsville, Ala.; Ames-Dryden Flight Research Facility, Edwards, Calif.; Johnson Space Center, Houston and NASA Headquarters, Washington, D.C. The television schedule will be updated to reflect changes dictated by mission operations.

Television schedules also may be obtained by calling COMSTOR 713/483-5817. COMSTOR is a computer data base service requiring the use of a telephone modem. A voice update of the television schedule is updated daily at noon eastern time.

Status Reports

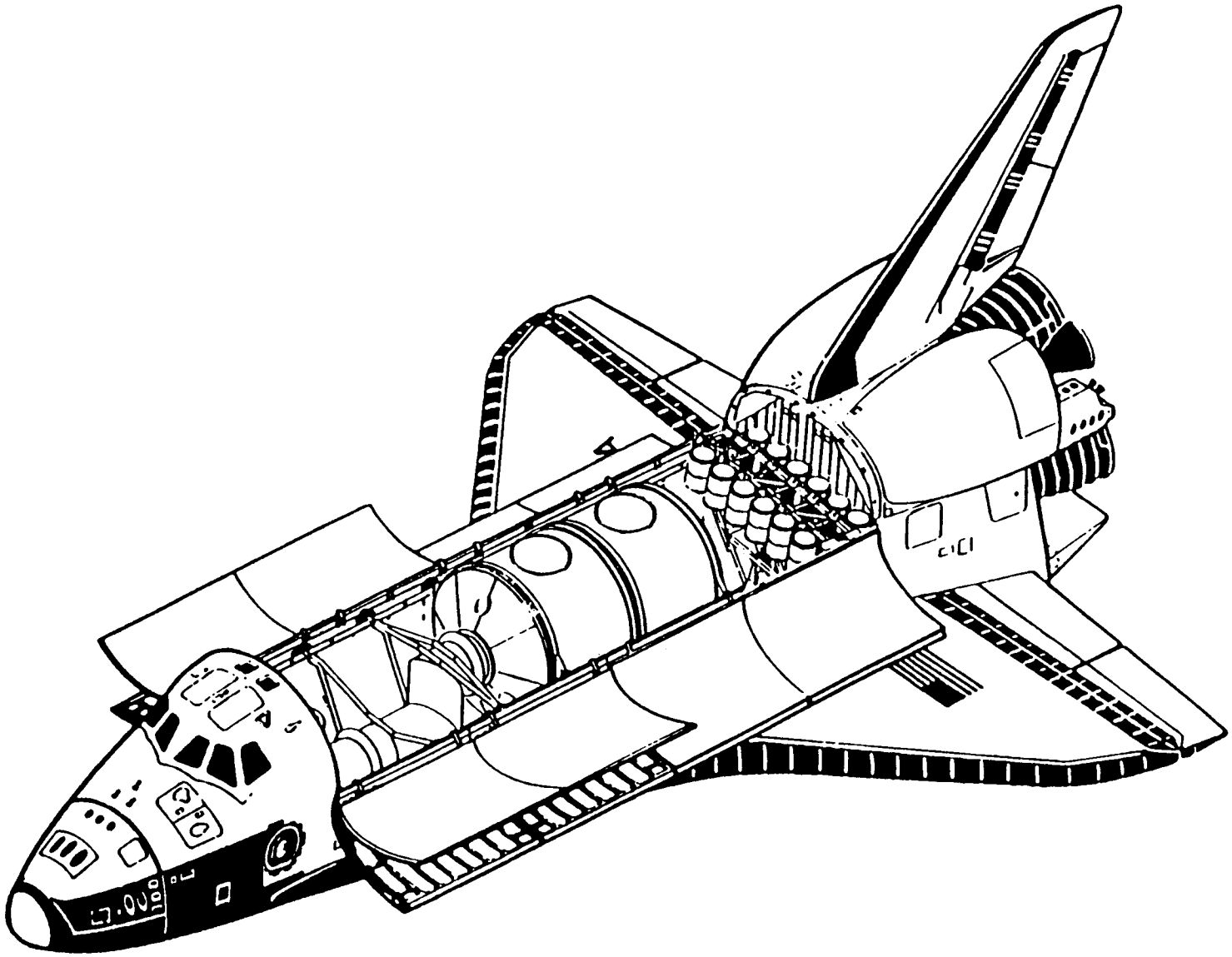
Status reports on countdown and mission progress, on-orbit activities and landing operations will be produced by the appropriate NASA news center.

Briefings

A mission press briefing schedule will be issued prior to launch. During the mission, change-of-shift briefings by the off-going flight director and the science team will occur at least once per day. The updated NASA Select television schedule will indicate when mission briefings are planned.

STS-47 QUICK LOOK

Launch Date and Site:	Sept. 11, 1992, Kennedy Space Center, Fla., Pad 39A
Launch Window:	10:25 a.m. - 12:55 p.m. EDT
Orbiter:	Endeavour (OV-105)
Orbit:	163 n.m. x 163 n.m.; 57 degrees inclination
Landing Date/Time:	7:01 a.m. EDT Sept. 18, 1992
Primary Landing Site:	Kennedy Space Center, Fla.
Abort Landing Sites:	Return to Launch Site - Kennedy Space Center, Fla. Transoceanic Abort Landing - Zaragoza, Spain; Ben Guerir, Morroco; Moron, Spain Abort Once Around - White Sands Space Harbor, N.M.
Crew:	Robert Gibson, Commander Curtis Brown, Pilot Mark Lee, Mission Specialist 1 Jay Apt, Mission Specialist 2 Jan Davis, Mission Specialist 3 Mae Jemison, Mission Specialist 4 Mamoru Mohri, Payload Specialist 1
Operational Shifts:	Red team -- Brown, Lee, Mohri Blue team -- Apt, Davis, Jemison
Cargo Bay Payloads:	Spacelab-J GAS Bridge (Get-Away Specials)
Middeck Payloads:	ISAIAH (Israel Space Agency Investigation About Hornets) SSCE (Solid Surface Combustion Experiment) SAREX-II (Shuttle Amateur Radio Experiment-II)



SL-J mission configuration

STS-47 VEHICLE AND PAYLOAD WEIGHTS

	Pounds
Orbiter (Endeavour) Empty and 3 SSMEs	173,174
Spacelab-J Module	21,861
Get-Away Specials Bridge	5,000
Israel Space Agency Investigation About Hornets	70
Solid Surface Combustion Experiment	253
Shuttle Amateur Radio Experiment	36
Detailed Supplementary Objectives	51
Total Vehicle At SRB Ignition	4,510,542
Orbiter Landing Weight	219,247

SPACE SHUTTLE ABORT MODES

Space Shuttle launch abort philosophy aims toward safe and intact recovery of the flight crew, orbiter and its payload. Abort modes include:

* Abort-To-Orbit (ATO) -- Partial loss of main engine thrust late enough to permit reaching a minimal 105-nautical mile orbit with orbital maneuvering system engines.

* Abort-Once-Around (AOA) -- Earlier main engine shutdown with the capability to allow one orbit around before landing at either Edwards Air Force Base, Calif.; White Sands Space Harbor, N.M; or the Shuttle Landing Facility (SLF) at the Kennedy Space Center, Fla.

* Trans-Atlantic Abort Landing (TAL) -- Loss of one or more main engines midway through powered flight would force a landing at either Zaragoza, Spain; Ben Guerir, Morocco; or Moron, Spain.

* Return-To-Launch-Site (RTLS) -- Early shutdown of one or more engines without enough energy to reach Zaragoza would result in a orbiter pitch around and thrust back toward KSC until within gliding distance of the SLF.

STS-47 contingency landing sites are Edwards Air Force Base, the Kennedy Space Center, White Sands Space Harbor, Zaragoza, Ben Guerir and Moron.

STS-47 TRAJECTORY SEQUENCE OF EVENTS

EVENT	MET (d:h:m:s)	RELATIVE VELOCITY (fps)	MACH	ALTITUDE (ft)
Launch	00/00:00:00			
Begin Roll Maneuver	00/00:00:10	189	17	801
End Roll Maneuver	00/00:00:19	430	38	3,674
SSME Throttle Down 67%	00/00:00:32	765	69	10,663
SSME Throttle Up 104%	00/00:01:04	1,513	1.57	41,860
Maximum Dyn. Pressure (Max Q)	00/00:01:05	1,548	1.62	43,059
SRB Separation	00/00:02:04	4,131	3.89	155,869
Main Engine Cutoff	00/00:08:34	25,000	21.61	376,708
Zero Thrust	00/00:08:40	25,000	N/A	376,909
ET Separation	00/00:08:52			
OMS-2 Burn	00/00:36:12			
Landing	06/20:36:00			

Apogee, Perigee at MECO: 160 x 17 nautical miles

Apogee, Perigee post-OMS 2: 163 x 163 nautical miles

STS-47 PRE-LAUNCH PROCESSING

KSC's Shuttle processing team began work to ready Endeavour for its second voyage into space on May 31 when the vehicle arrived at Orbiter Processing Facility bay 3 following its ferry flight back from California.

Post-flight tests and evaluations were performed on Endeavour following its maiden voyage. On July 14, the primary STS-47 payload, the Spacelab-J laboratory, was installed in Endeavour's payload bay while in the Orbiter Processing Facility (OPF0. Interface verification tests between the orbiter and laboratory were conducted within the next few days.

While in the OPF, technicians installed the three main engines in July. Engine 2026 is in the No. 1 position, Engine 2022 is in the No. 2 position and Engine 2029 is in the No. 3 position.

After being readied for its second flight, Endeavour was transferred out of the OPF and towed several hundred yards to the Vehicle Assembly Building and connected to its external tank and solid rocket boosters.

Meanwhile, solid rocket booster stacking activities commenced on June 11 and concluded in July. The external tank was attached to the boosters on July 13. Mobile launcher platform number 2 is being used for Endeavour's second flight.

Technicians attached the 100-ton space plane to its already stacked solid rocket boosters and external tank. Endeavour was transferred to pad 39-B. The Terminal Countdown Demonstration Test with the STS-47 flight crew was completed.

A standard 43-hour launch countdown is scheduled to begin 3 days prior to launch. During the countdown, the orbiter's fuel cell storage tanks and all orbiter systems will be prepared for flight.

About 9 hours before launch, the external tank will be filled with its flight load of a half million gallons of liquid oxygen and liquid hydrogen propellants. About 2 and one-half hours before liftoff, the flight crew will begin taking their assigned seats in the crew cabin.

Endeavour's end-of-mission landing is planned at Kennedy Space Center's Shuttle Landing Facility. KSC's landing and recovery team will perform normal convoy operations on the runway to safe the vehicle and prepare it for tow to the OPF.

Endeavour's next flight, STS-54, is targeted for the end of the year. The STS-54 crew aboard Endeavour will loft NASA's Tracking and Data Relay Satellite-F into geosynchronous orbit.

SPACELAB-J

Spacelab research offers unique opportunities to learn about basic scientific processes and the effects of space travel on humans in preparation for longer stays in space. These opportunities ultimately may lead to useful commercial and medical applications on Earth.

The Spacelab-J mission is a joint project in space-based research between the United States and Japan. Within the spacelab, NASA will fly Japan's "First Materials Processing Test," a collection of 34 material- and life-science investigations, seven U.S. experiments, plus two collaborative experiments between the two agencies.

For Spacelab-J, the long module is used. This self-contained 23-foot-laboratory contains a series of equipment racks that hold furnaces, computer and biological workstations, biological incubators, storage lockers and other equipment to perform experiments in space. Additional storage space and experiments are located in the orbiter crew cabin's mid-deck area.

SPACELAB-J EXPERIMENTS

These experiments should provide scientists with a better understanding of fundamental materials and biological processes. There are 43 investigations, including 24 dedicated to materials science and 19 to life science research.

The materials science experiments will explore five major areas -- biotechnology, electronic materials, fluid dynamics and transport phenomena, glasses and ceramics, and metals and alloys.

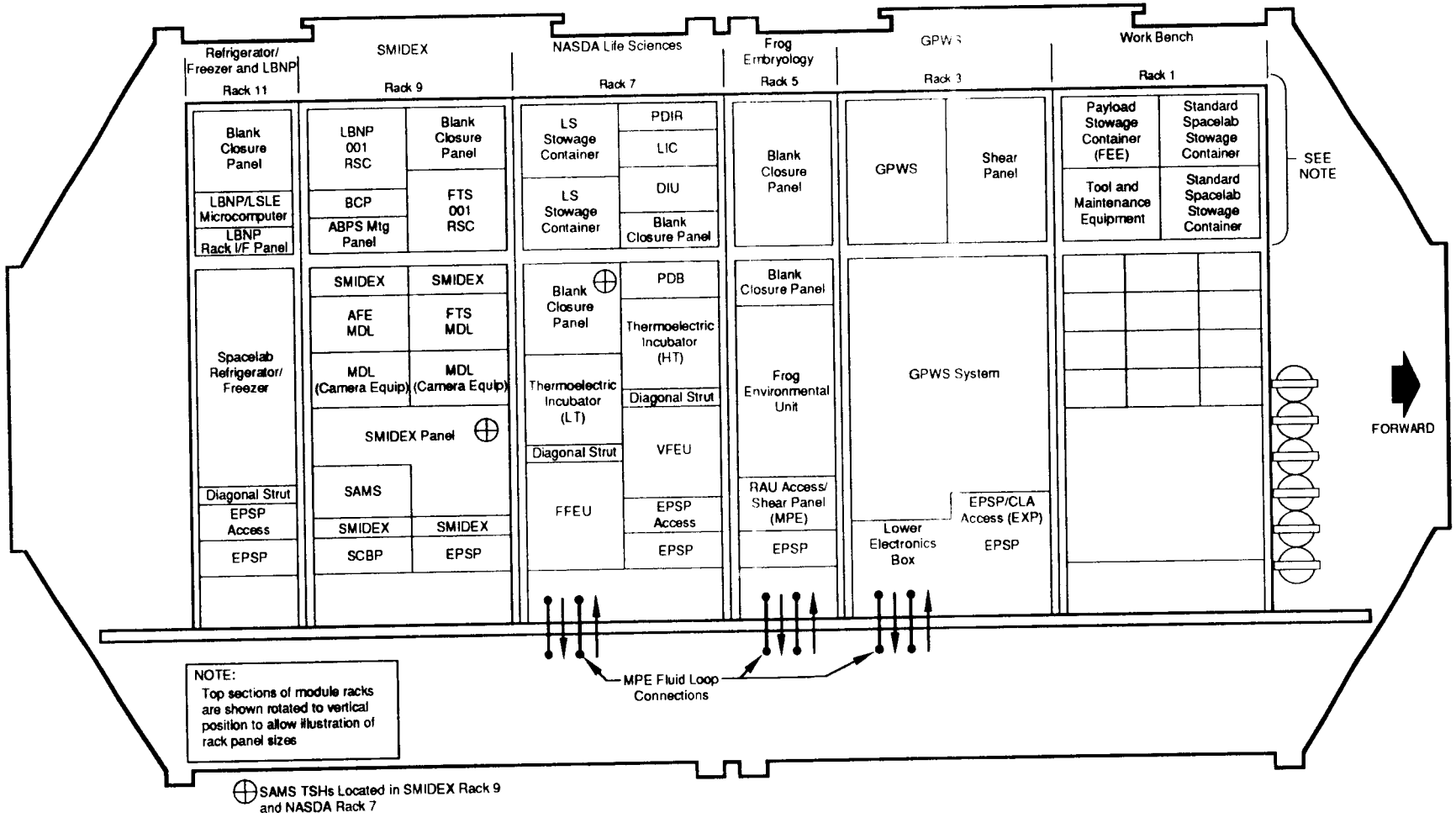
The life science experiments include cell separation, cell biology, developmental biology, animal and human physiology and behavior, space radiation and biological rhythms. A medical technology experiment also will be conducted.

MATERIALS SCIENCE

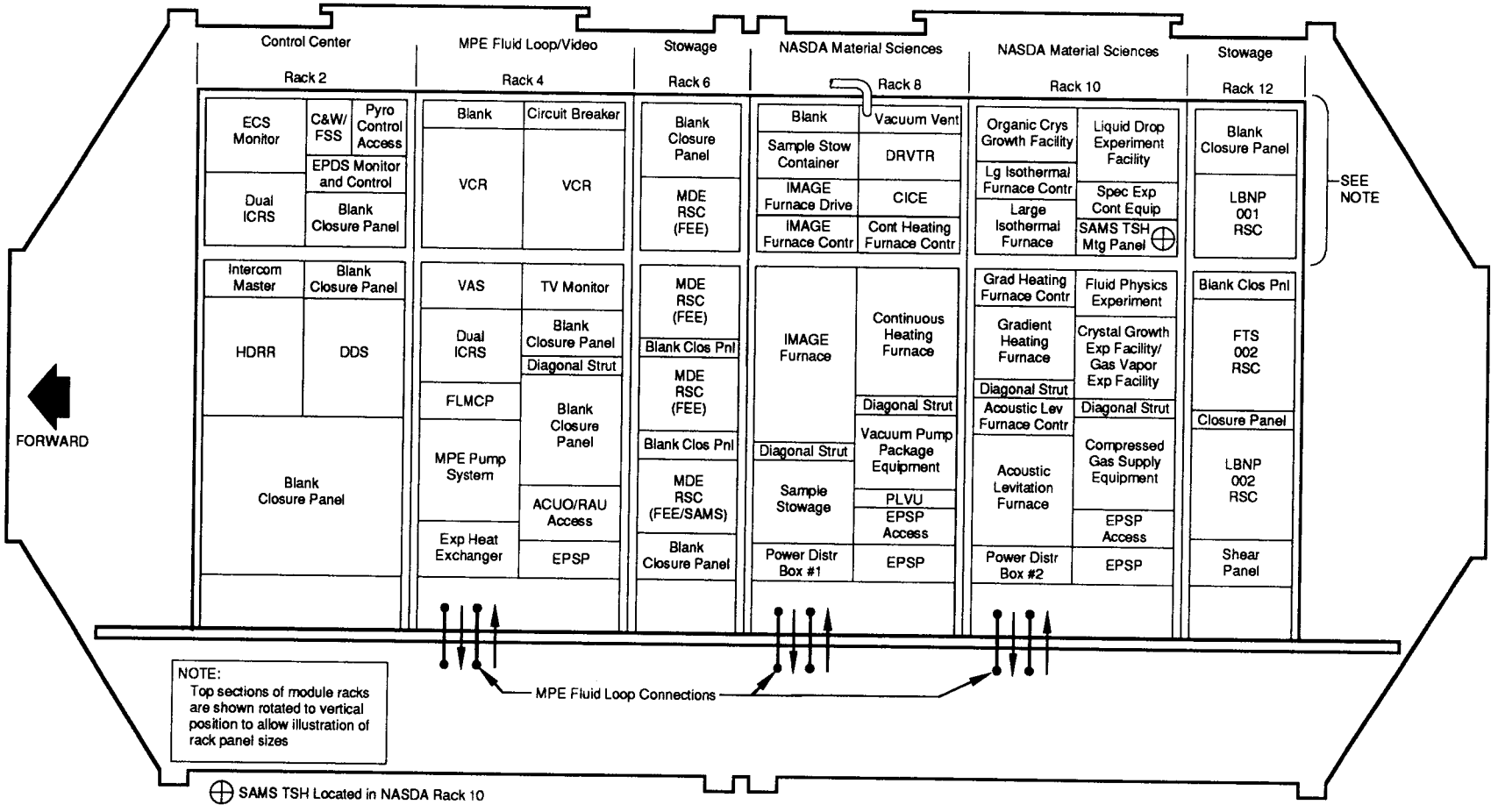
Spacelab-J microgravity science experiments cover three research disciplines: biotechnology, fluid dynamics and transport phenomena, and materials science. Within these disciplines, the areas covered include: protein crystal growth, electronic materials, fluid dynamics, glasses and ceramics, and metals and alloys. One instrument will collect data on the microgravity environment aboard Spacelab.

Protein Crystal Growth

This research field seeks to develop higher quality protein crystals than those developed on Earth and understand their internal crystalline order.



SL-J MODULE CONFIGURATION (PORT SIDE)



SL-J MODULE CONFIGURATION (STARBOARD SIDE)

Protein crystals on the Spacelab-J mission are grown in two scientific instruments, each relying on a different technique to promote crystallization: vapor diffusion and liquid/liquid diffusion.

Proteins are complex amino-acid compounds present in all life forms. They perform numerous, critical roles in biochemical processes. If scientists can determine how proteins work, new and improved medicines may be developed.

The functions of most organic molecules are determined by their three-dimensional structure. If scientists can determine the structure of a protein, this knowledge may allow the development of new and improved medicine and synthetic products.

Electronic Materials

In the electronic materials experiments, five kinds of semiconductor crystals will be grown using four specialized furnaces -- the gradient heating furnace, the image furnace, the crystal growth furnace and the continuous heating furnace. Semiconductors will be melted and solidified slowly to obtain high quality crystal.

The resulting crystals will be returned to Earth for in-depth study and may lead to a better understanding of manufacturing similar crystals on Earth. This eventually may lead to improved semiconductors and superconductors, and more efficient electronic components.

Fluid Dynamics and Transport Phenomena

Fluid dynamics and transport phenomena experiments will study the underlying physics at work when fluids are subjected to different conditions under microgravity conditions.

Liquid drops will be levitated and manipulated using sound waves in the Drop Dynamics in Space and Interference with Acoustic Field experiment.

Two other experiments -- the Study of Bubble Behavior and Marangoni-Induced Convection in Materials Processing Under Microgravity -- will study Marangoni convection, fluid movement caused by surface tension variations between regions of different temperatures.

On Earth, liquids are affected by buoyancy-driven convection. When a fluid is heated, lighter fluids rise and heavier fluids fall. In microgravity, this is much weaker, allowing Marangoni or surface tension driven convection to be studied. Marangoni convection is one of many phenomena that must be better understood for materials processing techniques to become more effective.

Photography and videotape recordings will be important tools in documenting these and other experiments. Such technology permits in-depth, frame-by-frame study of recordings of complex physics phenomena in laboratories back on Earth.

Glasses and Ceramics

New types of glasses and ceramics also may be developed through containerless processing methods. The Preparation of Optical Materials Used in Non-Visible Region experiment will create a non-silicone-based glass like that used in infrared-detecting devices such as telescope lenses.

This will be accomplished in an acoustic levitation furnace. This furnace uses sound waves to suspend, combine and melt ingredients in microgravity. It will form a glass after cooling. Containerless processing eliminates the possibility of introducing impurities, perhaps leading to glasses that will transmit more light.

The image furnace also will be used for two glass and ceramics experiments. The High Temperature Behavior of Glass experiment will collect data on the physical processes behind glass melting. The Growth of Samarskite Crystal in Microgravity will produce a rare mineral compound to better understand its properties and possible usefulness.

Metals and Alloys

A series of ten metals and alloys experiments will study the ways that ingredients may be combined to form new, improved materials. The large isothermal furnace will heat elements to a liquid state under various levels of pressure and cool them from the molten state to a useable solid.

On Earth, these processes are affected by gravity's pull. In space, substances can be mixed with much more control as they float in a weightless condition. The result is a more uniformly combined material with fewer impurities.

The understanding of such processing may lead to lighter, more stress-resistant metals, as well as more uniform semiconductors and superconductors. Such materials may have a broad range of uses -- from cars to computers to construction.

The Casting of Superconducting Filamentary Composite Materials and the Preparation of Nickel-Base Dispersion Strengthened Alloys experiments will contribute to this field of study.

Acceleration Data Collection

The Space Acceleration Measurement System will be used for the fourth time in Spacelab to collect data about acceleration forces experienced during the mission. This system of three sensor heads will be located in the Spaclab-J module. Such information will assist planners in developing scientific equipment and in placing sensitive experiments where they are least likely to be disturbed.

LIFE SCIENCES

The effects of microgravity on plants and animals, including humans, must be understood before long-term space travel and exploration missions can be undertaken. Life sciences research seeks to discover the effects of gravity versus microgravity environments on various life forms.

With that information, researchers hope to correct or prevent adverse physiological effects that result from living and working in space and to develop new scientific information to improve life on Earth.

Life sciences experiments aboard Spacelab J include: cell biology, developmental biology, animal and human physiology and behavior, space radiation and biological rhythms. One technology experiment in the medical field also will be conducted.

Biotechnology Two biological experiments will separate biological sample mixtures, composed of several types of cells or proteins, into individual purified fractions consisting of a particular protein or cell-type using electrical fields.

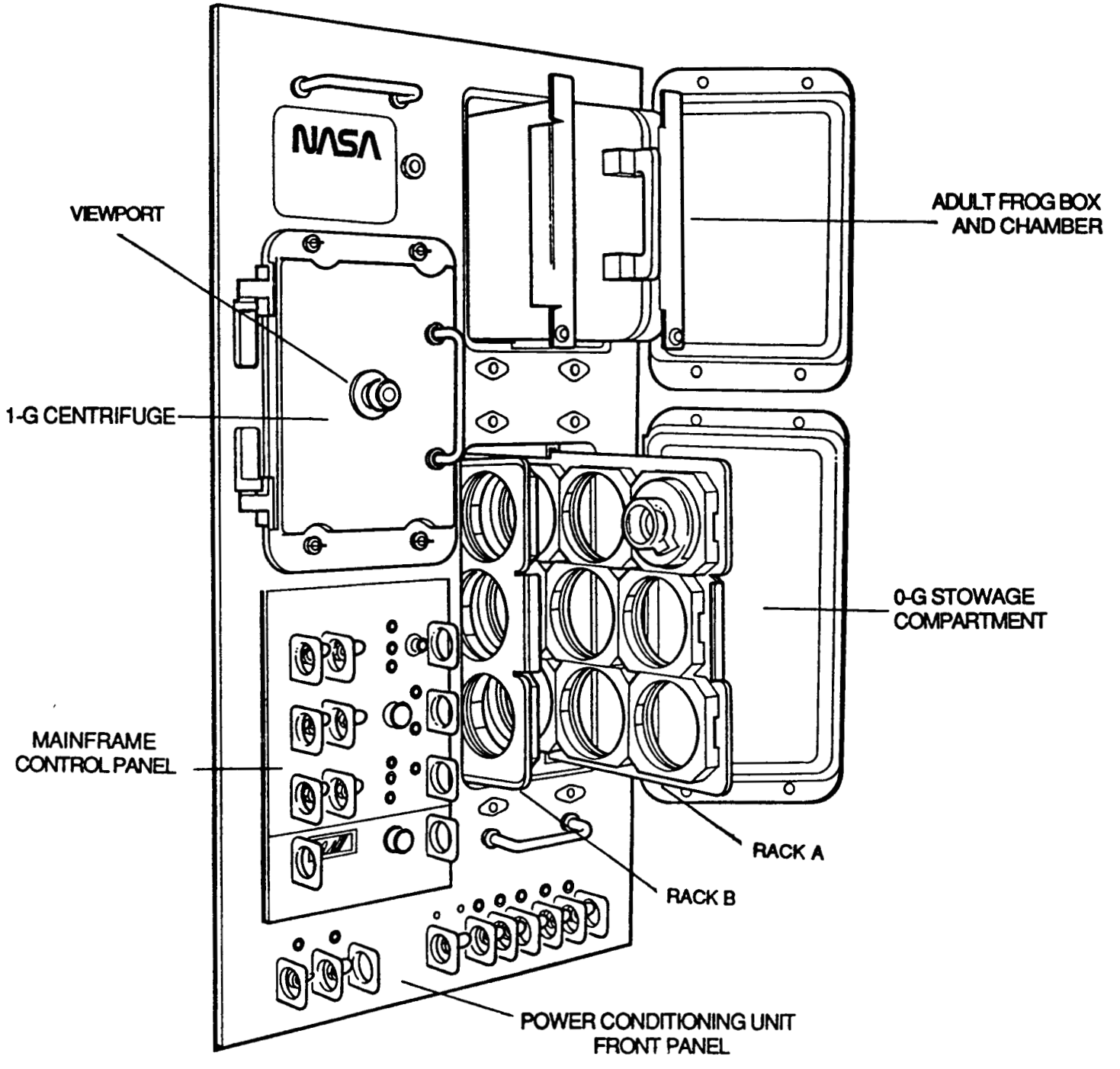
Cell Biology

Three cell culturing experiments will grow plant and animal cells to test the influence of gravity on development and function at the cellular level. One such test will be the production of antibodies in space.

Developmental Biology

Other experiments in the life sciences will study how gravity affects the development of animals. An experiment entitled Effects of Weightlessness on the Development of Amphibian Eggs Fertilized in Space will study the role of gravity in fertilization and development.

Female frogs will be carried aboard Spacelab J. Their eggs will be fertilized during the flight and will develop in a microgravity environment. Some eggs will be fixed at a certain point in their development, while others will be allowed to develop into tadpoles and adult frogs.



FRONT VIEW
FROG ENVIRONMENTAL UNIT

Another experiment to study the role of gravity on the early development of animals is The Effect of Low Gravity on Calcium Metabolism and Bone Formation. This study will examine how microgravity affects calcium metabolism and bone formation in chick embryos.

Physiology

Several experiments will examine the physiology of living organisms on this mission. These experiments will reveal more about how organisms function in the space environment. Several experiments will focus on the physiology of the vestibular-ocular system.

One experiment, The Comparative Measurement of Visual Stability in Earth and Cosmic Space, will study the effects of microgravity on visual stability. This experiment will examine head and eye movements while the crew member visually tracks a flickering light target.

Another experiment designed to study the vestibular-ocular system is The Neurophysiological Study on Visuo-vestibular Control of Posture and Movement in Fish During Adaptation to Weightlessness.

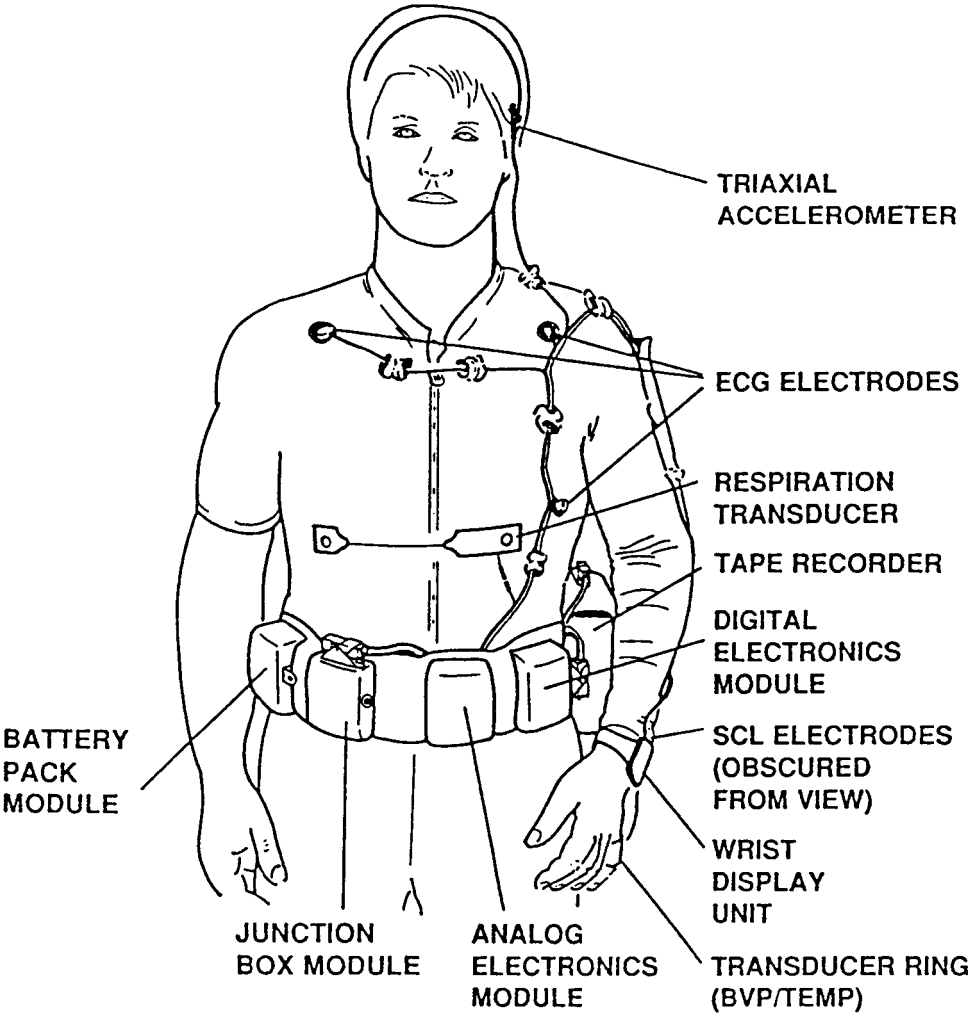
In this experiment, two Japanese koi fish (carp) will be exposed to a varying light stimulus. One fish will have its otolith structure removed. The otolith is a gravity-sensing structure in the inner ear. This fish's response will be compared to the other fish to identify differences in how each reacts to the same stimulus.

Three crew members will participate in experiments on physical adaptation to space. While awake, each will wear a special suit fitted with various sensors that monitor and record various physical responses. Urine collection will gauge the intake and output of fluids, which shift toward the upper body in microgravity.

Space motion sickness is an element of general Space Adaptation Syndrome that affects many space travelers. A possible countermeasure for this will be studied in an experiment entitled The Autogenic Feedback Training Experiment: A Preventative Method for Space Motion Sickness; Autogenic Feedback Training for Vestibular Symptomology.

This two-part experiment is a continuation from an experiment that flew on the Spacelab-3 mission. On Spacelab J two crew members are participants in this experiment.

One crew member will use biofeedback, a technique where one becomes aware of unconscious or involuntary bodily processes (such as heartbeat and skin temperature), in order to consciously control them. The goal is to train astronauts to overcome the effects of space motion sickness without using artificial means, such as drugs.



FRONT VIEW OF AFS-2 INSTRUMENTATION

The second participant, the control, has not been trained in biofeedback techniques. But that participant's responses to similar circumstances will be recorded. Data collected from the sensor suits they will wear also may help predict the likelihood of space motion sickness in future candidates for space travel.

In space, muscles do not have to work as hard as they do under gravity's influence. Bones do not receive the same stress that they do when under a gravitational field. As a result, crew members from previous missions have lost calcium from bones and protein from muscles during flight.

These losses could become a serious problem if crews spend many months or years in a microgravity environment. Several experiments being flown aboard Spacelab J have been designed to study this problem. These experiments will gather information about the process and extent of bone and muscle loss after exposure to space.

Two experiments will specifically study bone loss. Fertilized chicken eggs and rat bone cells will be examined after the mission for cartilage growth and bone formation.

To study how muscle mass is lost while in space, the Magnetic Resonance Imaging (MRI) After Exposure to Microgravity experiment employs MRI to examine muscle and bone in selected crew members before and after the mission.

MRI uses a magnetic field and radio waves to produce an image of the inside of the body, much better than conventional x-rays, but unlike conventional x-rays, it has no known health hazards. The MRI will allow investigators to examine calf and thigh muscles and to look for changes in spinal bone marrow and discs (vertebrae).

Radiation and Environmental Health

An understanding of the radiation environment in space and the effects of radiation on life forms is critical before long-term space journeys are undertaken.

To examine the biological effects of space radiation, fruit fly larvae will be flown in special incubators exposed to the cosmic ray environment. When the flies hatch, they will be examined for radiation-induced mutations.

Technology Experiment

When intravenous (IV) fluids are administered to a patient on Earth, gravity aids in their delivery and flow. The absence of gravity presents a problem should such medical treatment be needed during a space mission. Therefore, the Fluid Therapy System will be tested on Spacelab J. The tests

will examine the production of medicines and the administration of IV fluids in the absence of gravity.

SPACELAB-J EXPERIMENTS LISTING

Sponsored by the National Aeronautics and Space Administration

Materials Sciences

Space Acceleration Measurement System
Dr. Richard DeLombard, Lewis Research Center, Cleveland

Fluid Therapy System: Inflight Demonstration of the Space Station Freedom Health Maintenance Facility Fluid Therapy System
Dr. Charles Lloyd, Johnson Space Center, Houston

Magnetic Resonance Imaging After Exposure to Microgravity
Dr. Adrian LeBlanc, Methodist Hospital, Houston

Life Sciences

Protein Crystal Growth
Dr. Charles Bugg, University of Alabama, Birmingham

Autogenic Feedback Training Experiment: A Preventative Method for Space Motion Sickness: Autogenic Feedback Training for Vestibular Symptomology
Dr. Patricia Cowings, Ames Research Center, Moffett Field, Calif.

Bone Cell Growth and Mineralization in Microgravity
Dr. Nicole Partridge, St. Louis University Medical School, St. Louis

Affects of Weightlessness in the Development of Amphibian Eggs Fertilized in Space
Kenneth A. Souza, Ames Research Center, Moffett Field, Calif.

Lower Body Negative Pressure: Countermeasure for Reducing Post-Flight Orthostatic Intolerance
Dr. John Charles, Johnson Space Flight Center, Houston

Plant Culture Research (Gravity, Chromosomes, and Organized Development in Aseptically Cultured Plant Cells)
Dr. Abraham Krikorian, State University of New York, Stony Brook

Magnetic Resonance Imaging After Exposure to Microgravity
Dr. Adrian LeBlanc, Methodist Hospital, Houston

From The National Space Development Agency of Japan

First Materials Processing Test -- 34 materials and life sciences experiments

Materials Sciences

Growth Experiment of Narrow Band-Gap Semiconductor Pb-Sn-Te Single Crystals in Space (M-1)
Dr. Tomoaki Yamada, Nippon Telegraph And Telephone Corp.

Growth of Pb-Sn-Te Single Crystal by Travelling Zone Method in Low Gravity (M-2)
Dr. Souhachi Iwai, Nippon Telegraph and Telephone Corp.

Growth of Semiconductor Compound Single Crystal by Floating Zone Method (M-3)
Dr. Isao Nakatani, National Research Institute for Metals

Casting of Superconducting Filamentary Composite Materials (M-4)
Dr. Kazumasa Togano, National Research Institute for Metals

Formation Mechanism of Deoxidation Products in Iron Ingot Deoxidized With Two or Three Elements (M-5)
Dr. Akira Fukuzawa, National Research Institute for Metals

Preparation of Nickel Base Dispersion Strengthened Alloys (M-6)
Dr. Yuji Muramatsu, National Research Institute for Metals

Diffusion in Liquid State and Solidification of Binary System (M-7)
Dr. Takehiro Dan, National Research Institute for Metals

High Temperature Behavior of Glass (M-8)
Dr. Naohiro Soga, Kyoto University

Growth of Silicon Spherical Crystals and Surface Oxidation (M-9)
Dr. Tatau Nishinaga, University of Tokyo

Study on Solidification of Immiscible Alloy (M-10)
Dr. Akihiko Kamio, Tokyo Institute of Technology

Fabrication of Very-Low-Density, High-Stiffness Carbon Fiber/Aluminum Hybridized Composites (M-11)
Dr. Tomoo Suzuki, Tokyo Institute of Technology

Study on the Mechanisms of Liquid Phase Sintering (M-12)
Dr. Shiro Kohara, Science University of Tokyo

Fabrication of Sl-As-Te:Ni Ternary Amorphous Semiconductor in Microgravity Environment (M-13)
Dr. Yoshihiro Hamakawa, Osaka University

Gas-Evaporation in Low Gravity Field: Congelation Mechanism of Metal Vapors (M-14)
Dr. Nobuhiko Wada, Nagoya University

Drop Dynamics in Space and Interference With Acoustic Field (M-15)
Dr. Tatsuo Yamanaka, National Aerospace Laboratory

Study of Bubble Behavior (M-16)
Dr. Hisao Azuma, National Aerospace Laboratory

Preparation of Optical Materials Used in Non-Visible Region (M-17)
Junji Hayakawa, Government Industrial Research Institute

Marangoni Induced Convection in Materials Processing Under Microgravity (M-18)
Dr. Shintaro Enya, Heavy Industries

Solidification of Eutectic System Alloys in Space (M-19)
Dr. Atsumi Ohno, Chiba Institute of Technology

Growth of Samarskite Crystal in Microgravity (M-20)
Dr. Shunji Takekawa, National Institute for Research in Inorganic Materials

Growth Experiment of Organic Metal Crystal in Low Gravity (M-21)
Dr. Hiroyuki Anzai, National Electorotechnical Laboratory

Crystal Growth of Compound Semi-conductors in a Low-Gravity Environment (M-22)
Dr. Masami Tatsumi, Sumitomo Electric Industries, Ltd.

Life Sciences

Endocrine and Metabolic Changes in Payload Specialist (L-1)
Dr. Hisao Seo, Nagoya University

Neurophysiological Study on Visuo-Vestibular Control of Posture and Movement in Fish During Adaptation to Weightlessness (L-2)
Dr. Masao Kuroda, Osaka University

Comparative Measurement of Visual Stability in Earth and Cosmic Space (L-4)
Dr. Kazuo Koga, Nagoya University

Crystal Growth of Enzymes in Low Gravity (L-5)
Dr. Yuhei Morita, Kyoto University

Studies on the Effects of Microgravity on the Ultrastructure and Functions of Cultured Mammalian Cells (L-6)
Dr. Atsushige Sato, Tokyo Medical and Dental University

The Effect of Low Gravity on Calcium Metabolism and Bone Formation (L-7)
Dr. Tatsuo Suda, Showa University

Separation of the Animal Cells and Cellular Organella by Means of Free Flow Electrophoresis (L-8)
Dr. Tokio Yamaguchi, Tokyo Medical and Dental University

Genetic Effects of HZE and Cosmic Radiation (L-9)
Dr. Mituo Ikenaga, Kyoto University

Space Research on Perceptual Motor Functions Under the Zero Gravity Condition (L-10)
Akira Tada, National Aerospace Laboratory

Study on the Biological Effect of Cosmic Radiation and the Development of Radiation Protection Technology (L-11)
Dr. Shunji Nagaoka, National Space Development Agency of Japan

Circadian Rhythm of Conidiation in Neurospora Crassa (L-12)
Dr. Yasuhiro Miyoshi, University of Shizuoka

GET AWAY SPECIAL EXPERIMENTS ON STS-47

Ten years ago, the first Get Away Special payload flew on Space Shuttle Columbia. Since then, several hundred experiments have been carried out in space as part of NASA's Get Away Special (GAS) Program.

GAS payloads from industry, educational institutions, domestic and foreign governments, as well as from individuals wanting to carry out scientific research on Shuttle flights have participated in the GAS program, managed by NASA's Goddard Space Flight Center, Greenbelt, Md. This program is offered to customers for a nominal fee on a space-available basis. Clarke Prouty is GAS Mission Manager, and Larry Thomas provides customer support at Goddard.

The GAS bridge, capable of holding a maximum of 12 canisters, spans the payload bay of the orbiter and offers a convenient way of flying several canisters simultaneously. Ten GAS payloads originally were scheduled to fly on this mission. However, one GAS payload cancelled because of technical difficulties. To fill the bridge, three GAS ballast payloads will be used.

The most recent GAS payload flew on STS-45 in March 1992. To date, 78 GAS cans have flown on 18 missions. GAS experiments from five countries are on this mission. The countries represented are Sweden, France, Canada, England and the United States. Brief descriptions of the payloads on STS-47 follow.

G-102 Sponsor: Boy Scouts of America's Exploring Division (in cooperation with the TRW Systems Integration Group, Fairfax, Va.)

In 1978, Explorer posts were invited to submit ideas for experiments. This final flight complement of seven experiments was selected through a three-stage elimination process from 38 proposals originally submitted.

The seven experiments and their sponsors are: Capillary Pumping developed by Explorer Post 9005 and sponsored by the McDonnell Douglas Corp., St. Louis, Mo.; Cosmic Ray developed by Explorer Ship 101 and sponsored by the American Legion of Bridgeport, Conn.; Crystal Growth developed by Explorer Post 310 and Emulsions developed by Explorer Post 475, both sponsored by Chesebrough Pond's Research Laboratory, Trumbull, Conn.; Fiber Optics developed by Explorer Post 475 sponsored by the Naval Avionics Center, Indianapolis, Ind.; Floppy Disk developed by Explorer Post 1022 sponsored by the Church of Jesus Christ of Latter Day Saints, Columbia, Md.; Fluid Droplets developed by Explorer Post 822 sponsored by Martin Marietta, Littleton, Colo; Command, Power and Mechanical Systems designed by Explorer Post 1275 sponsored by the Goddard Explorer Club of NASA Goddard Space Flight Center, Greenbelt, Md.

G-255 Sponsor: Kansas University Space Program, Lawrence, Kansas

This payload contains three experiments based on the analysis of biochemistry structures in microgravity. The payload uses a computer controller and an active thermal control system. The first experiment will crystalize enzymes. The second will conduct research in cell formations. In the third experiment, seeds will be used to test any effects that the space environment may have on seed germination rates.

The Kansas University Space program is comprised of volunteer undergraduate engineering and science majors.

G-300 Sponsor: Matra Marconi Space/Laboratorie De Genie Electrique De Paris, Paris, France

This is the first GAS payload to fly from France. The objective of this experiment is to explore thermal conductivity of liquids in microgravity. Measurements will be performed on three liquids: distilled water (as a standard) and two silicone oils. Using a modified "hot plate" method, a simplified guard ring reduces the heat losses.

G-330 Sponsor: Swedish Space Corporation, Solna, Sweden

The scientific aim of this experiment is to study the breakdown of a planar solid/liquid interface when the growth rate increases from stable to unstable conditions. To do this, a sample of Germanium doped with Gallium will be processed during the flight. To perform the experiment, a gradient furnace

was developed in which the growth rate can be controlled along the crystal. The gradient furnace consists of a ceramic crucible with five heating elements and a cooler.

G-482 Sponsor: Spar Aerospace Ltd., Quebec, Canada

The purpose of this experiment is to compare the behavior of bread yeast in the absence of gravity to the behavior of bread yeast in normal atmospheric conditions. The experiment mixes flour, water and the designated yeast on-orbit, allows the mixture to rise, and then "bakes" it.

G-520 Sponsor: Ashford School, Kent, England

This payload is the first British school experiment to fly in space. The project won first-prize in a nationwide school competition run by Independent Television News (ITN). Two experiments are part of this payload. In the first, the students designed a small, leak-proof, transparent container filled with sodium silicate solution. A few grams of cobalt nitrate crystals will be released into the center of the solution. As soon as the crystals are dropped into the solution, a camera will record about 100 pictures for study on return to Earth.

In the second experiment, a chemical solution is placed on a gel containing another compound, resulting in a series of rings appearing in the gel. The resulting rings will be photographed by a second camera, taking 100 pictures of crystal growth at varying intervals over 4 days.

G-521 Sponsor: Canadian Space Agency, Ottawa, Canada

This payload is called QUESTS (Queens's University Experiment on the Shuttle Transportation System) and includes 15 furnaces. Twelve of the furnaces are constant-temperature furnaces. These furnaces will be used for studies of diffusion in metals when in the liquid state. The other three furnaces are temperature-gradient, in which a uniform temperature gradient is applied along the sample, and the temperatures are slowly decreased to allow crystal growth to occur from one end of the sample.

G-534 Sponsor: NASA Lewis Research Center, Cleveland

The objective of this experiment is to improve the understanding of the fundamental mechanisms that constitute nucleate pool boiling. The experiment will investigate the heat transfer and vapor bubble dynamics associated with nucleation, bubble growth/collapse and subsequent motion.

G-613 Sponsor: University of Washington, Seattle

This experiment -- an experimental cooling system -- was designed by University of Washington engineering students. Liquid droplets will be pumped from a shower head-like device to a spinning collection bowl that will substitute for gravity by acting as a centrifuge. The rotating bowl will

throw the weightless liquid to the edge and direct it into a collection pipe for reuse. A smaller experiment, a micro heat pipe also will be flown in this canister.

ISRAELI SPACE AGENCY INVESTIGATION ABOUT HORNETS

The Israeli Space Agency Investigation About Hornets (ISAIAH) experiment will be carried on Endeavour's middeck to research the effect of weightlessness on combs built by oriental hornets.

The oriental hornet has a unique ability to build combs in the direction of gravity. Terrestrial studies using centrifugal force to simulate different directions of gravity other than Earth's gravity have shown that such forces are the only factor that determines the direction a comb is built. ISAIAH is designed to obtain insight into this unique trait of the oriental hornet by testing the hornets' ability to orient their combs when in weightlessness.

ISAIAH fits into one middeck locker and consists of two compartments. A front compartment contains electronics, a blower, two tape recorders and front panel controls for the experiment. A back compartment contains 18 test chambers of various shapes and a metronome. Each of the nine top side chambers has a lamp to simulate day and night, an audio sensor and a food and water container. Each of the bottom side chambers will remain in constant darkness when the experiment is inside the locker.

Two lexan windows, one on the top and another on the bottom, will allow the crew to view and photograph the progress of the experiment. ISAIAH is sponsored by the Israeli Space Agency. The hardware was developed by Israel Aircraft Industries International, Inc.

SHUTTLE AMATEUR RADIO EXPERIMENT

The Shuttle Amateur Radio Experiment (SAREX) is designed to demonstrate the feasibility of amateur shortwave radio contacts between the Space Shuttle crew and ground amateur radio operators, often called ham radio operators. SAREX also serves as an educational opportunity for schools around the world to learn about space first hand by speaking directly to astronauts aboard the Shuttle via ham radio. Contacts with certain schools are included in planning the mission.

STS-47 crew members Jay Apt, call sign N5QWL, and Mamoru Mohri, call sign 7L2NJY, will operate SAREX. Ham operators may communicate with the Shuttle using VHF FM voice transmissions and digital packet. The primary voice frequencies to be used during STS-47 are 145.55 MHz for transmissions from the spacecraft to the ground and 144.95 MHz, 144.91 MHz and 144.97 MHz for transmissions from the ground to the spacecraft. Digital packet will operate on 145.55 MHz for transmissions from the Shuttle to the ground and on 144.70 MHz for transmissions from the ground to the Shuttle.

Equipment aboard Columbia will include a low-power, hand-held FM transceiver, spare batteries, headset, an antenna custom designed by NASA to fit in an orbiter window, an interface module and equipment cabinet.

SAREX has flown previously on Shuttle missions STS-9, STS-51F, STS-35, STS-37, STS-45 and STS-50. SAREX is a joint effort by NASA, the American Radio Relay League (ARRL), the Amateur Radio Satellite Corp. and the Johnson Space Center Amateur Radio Club. Information about orbital elements, contact times, frequencies and crew operating times will be available from these groups during the mission and from amateur radio clubs at other NASA centers.

Ham operators from the JSC club will be operating on HF frequencies, and the AARL (W1AW) will include SAREX information in its regular HF voice and Teletype bulletins. The Goddard Space Flight Center Amateur Radio Club, Greenbelt, Md., will operate 24 hours a day during the mission, providing information on SAREX and retransmitting live Shuttle air-to-ground communications. In addition, the NASA Public Affairs Office at the Johnson Space Center will have a SAREX information desk during the mission.

STS-47 SAREX Operating Frequencies

Location	Shuttle Transmission	Shuttle Reception
U.S., Africa	145.55 MHz	144.95 MHz
South America	145.55	144.97
and Asia	145.55	144.91
Europe	145.55 MHz	144.80 MHz
	145.55	144.75
	145.55	144.70

Goddard Amateur Radio Club Operations
(SAREX information and Shuttle audio broadcasts)

3.860 MHz	7.185 MHz
14.295 MHz	21.395 MHz
	28.395 MHz

SAREX information also may be obtained from the Johnson Space Center computer bulletin board (JSC BBS), 8 N 1 1200 baud, at 713/483-2500 and then type 62511.

SOLID SURFACE COMBUSTION EXPERIMENT

The Solid Surface Combustion Experiment (SSCE) is a study of how flames spread in microgravity. Comparing data on how flames spread in microgravity with knowledge of how flames spread on Earth may contribute to improvements in fire safety and control equipment. This will be the fifth time SSCE has flown aboard the Shuttle. Ultimately, plans call for SSCE to fly a total of eight times, testing the combustion of different materials under different atmospheric conditions.

In the SSCE planned for STS-47/SL-J, scientists will test how flames spread along a instrumented filter paper sample in a test chamber containing 35% oxygen and 65% nitrogen at 1.5 atmospheric pressure.

During the four previous missions on which this experiment was flown, samples of the filter paper were burned in atmospheres with different levels of oxygen and pressure. The filter paper and Plexiglas for later flights were chosen as test materials because extensive data bases already exist on the combustion of these materials in Earth's gravity. Thus, combustion processed on Earth and in space can be readily compared.

Scientists will use computer image enhancement techniques to analyze the film record of the Solid Surface Combustion Experiment. They then will compare the enhanced images and recorded temperature and pressure data with a computer simulation of the flame spreading process. Reconciling the two sets of data is expected to provide new insights into the basic process of combustion.

Robert A. Altenkirch	John M. Koudelka
Principal Investigator	Project Manager
Mississippi State University	NASA Lewis Research Center, Cleveland

SPACE ACCELERATION MEASUREMENT (SAMS)

The Space Acceleration Measurement System (SAMS) is designed to measure and record low-level acceleration that the Spacelab experiences during typical on-orbit activities. The three SAMS sensor heads are mounted on or near experiments to measure the acceleration environment experienced by the research package. The signals from these sensors are amplified, filtered and converted to digital data before it is stored on optical disks.

For the first SL-J mission, the main unit of the Space Acceleration Measurement System will be mounted in the SMIDEX Rack of the Spacelab module, near the aft end of the module. Its three remote sensor heads will be mounted on the First Material Processing Test Modular Electronic Levitator, Life Science and Rack #9.

SAMS flight hardware was designed and developed in-house by the NASA Lewis Research Center and Sverdrup Technology Inc. project team.

Charles Baugher
Principal Investigator
NASA Marshall Space Flight Center,
Huntsville, Ala.

Richard DeLombard
Project Manager
NASA Lewis Research Center,
Cleveland

STS-47 CREW BIOGRAPHIES

Robert L. Gibson, 45, Capt., USN, is Commander of Endeavour for mission STS-47. Selected as an astronaut in January 1978, Gibson considers Lakewood, Calif., his hometown and will be making his fourth space flight.

Gibson graduated from Huntington High School, Huntington, N.Y., in 1964 and received a bachelor's in aeronautical engineering from California Polytechnic State University in 1969.

Gibson first flew as pilot of STS-41B in February 1984, a mission that deployed two communications satellites and was the first flight of the Manned Maneuvering Unit, a spacewalker's jet backpack. He next served as Commander of STS-61C in January 1986, a mission during which the crew deployed a communications satellite and conducted various experiments in astrophysics and materials processing. His third flight was Commander of STS-27, a Department of Defense-dedicated Shuttle mission in December 1988.

Gibson has been a private airplane pilot since age 17 and entered the Navy in 1969, flying combat missions in Southeast Asia from 1972-1975 and graduating from the Naval Test Pilot School in 1977.

He has logged 442 hours in space and more than 4,600 hours flying time in more than 45 types of aircraft.

Curtis L. Brown, Jr., 36, Major, USAF, will serve as Pilot. Selected as an astronaut in June 1987, Brown was born in Elizabethtown, N.C., and will be making his first space flight.

Brown graduated from East Bladen High School in Elizabethtown in 1974 and received a bachelor's in electrical engineering from the Air Force Academy in 1978.

Brown was commissioned in the Air Force in 1978 and graduated pilot training at McLaughlin Air Force Base, Del Rio, Texas, in 1979. After completing training for the A-10 aircraft in January 1980, he began flying the A-10 at Myrtle Beach Air Force Base, S.C.

In 1982, he was assigned as an A-10 instructor at Davis-Monthan Air Force Base, Ariz. In 1983, he attended the Air Force Fighter Weapons School at Nellis Air Force Base and returned to Davis-Monthan as an A-10 weapons and tactics instructor later that year.

In 1986, he graduated from the Air Force Test Pilot School and was serving as a test pilot in the A-10 and F-16 aircraft at Eglin Air Force Base, Fla., upon his selection by NASA.

Brown has logged more than 3,100 hours flying time.

Mark C. Lee, 40, Lt. Col., USAF, will be Mission Specialist 1. Selected as an astronaut in May 1984, Lee considers Viroqua, Wis., his hometown and will be making his second space flight.

Lee graduated from Viroqua High School in 1970, received a bachelor's in civil engineering from the Air Force Academy in 1974 and received a master's in mechanical engineering from the Massachusetts Institute of Technology in 1980.

Lee first flew as a mission specialist on STS-30 in May 1989, a flight that deployed the Magellan planetary probe to map Venus. Prior to joining NASA, Lee flew the F-4 aircraft at Okinawa Air Force Base, Japan, for 2 and a half years. At the time of his selection as an astronaut, he was stationed at Hill Air Force Base flying the F-16 as Flight Commander of the 4th Tactical Fighter Squadron. Lee has logged more than 2,750 flying hours in T-38, F-4 and F-16 aircraft. He has logged 97 hours in space.

Jay Apt, 43, will be Mission Specialist 2. Selected as an astronaut in June 1985, Apt considers Pittsburgh, Pa., his hometown and will be making his second space flight.

Apt graduated from Shady Side Academy in Pittsburgh in 1967, received a bachelor's in physics from Harvard College in 1971 and received a doctorate in physics from the Massachusetts Institute of Technology in 1976.

Apt first flew on STS-37 in April 1991, a mission on which the Gamma Ray Observatory was deployed, and Apt performed two spacewalks. Prior to selection as an astronaut, Apt served as a staff member of the Center for Earth and Planetary Physics at Harvard from 1976-1980 and as Assistant Director of Harvard's Division of Applied Sciences from 1978-1980.

Apt joined NASA's Jet Propulsion Laboratory, Pasadena, Calif., in 1980 and served as Science Manager of the Table Mountain Observatory before becoming a payloads officer working in Johnson Space Center's Mission Control in 1982. He was serving as a payloads officer at the time of his selection.

An instrument-rated private pilot, Apt has logged more than 2,500 flying hours in 25 types of aircraft, sailplanes and man-powered craft. He has logged 143 hours in space, including almost 11 hours spacewalking.

N. Jan Davis, 38, will be Mission Specialist 3. Selected as an astronaut in June 1987, Davis considers Huntsville, Ala., her hometown and will be making her first space flight.

Davis graduated from Huntsville High School in 1971, received a bachelor's in applied biology from the Georgia Institute of Technology in 1975, received a bachelor's in mechanical engineering from Auburn University in 1975, received a master's in mechanical engineering from the University of Alabama in Huntsville in 1983 and received a doctorate in mechanical engineering from the University of Alabama in Huntsville in 1985.

Davis joined Texaco, Inc., in Bellaire, Texas, in 1977 as a petroleum engineer working in tertiary oil recovery. In 1979, she joined NASA's Marshall Space Flight Center in Huntsville where she served as team leader in the Structural Analysis Division working on the structural analysis and verification of the Hubble Space Telescope (HST), the HST maintenance mission and the Advanced X-Ray Astrophysics Facility. She later was assigned as the Lead Engineer for redesign of the Shuttle's solid rocket booster external tank attach ring after the STS-51L accident.

As an astronaut, Davis' assignments have included technical support for development of the Tethered Satellite System mission and serving as spacecraft communicator in Mission Control for six Shuttle flights.

Mae C. Jemison, 35, will be Mission Specialist 4. Selected as an astronaut in June 1987, Jemison considers Chicago, Ill., her hometown and will be making her first spaceflight.

Jemison graduated from Morgan Park High School in Chicago in 1973, received a bachelor's in chemical engineering from Stanford University in 1977 along with fulfilling requirements for a bachelor's in African and Afro-American studies and received a doctorate in medicine from Cornell University in 1981.

Jemison completed her internship at the Los Angeles County/University of Southern California Medical Center in July 1982 and worked as a general practicioner with the INA/Ross Loos Medical Group in Los Angeles until December 1982.

From 1983-1985, she served as the Area Peace Corps Medical Officer for Sierra Leone and Liberia in West Africa, managing the health care delivery system for the Peace Corps and the U.S. Embassy.

Jemison joined CIGNA Health Plans of California in October 1985 and worked as a general practicioner and studied engineering in Los Angeles until her selection by NASA.

Mamoru Mohri, 44, will be Payload Specialist 1. Mohri was born in Yoichi-machi, Hokkaido, Japan and will be making his first space flight.

Mohri was selected as a payload specialist for the National Space Development Agency of Japan (NASDA) in 1985. He received an undergraduate degree from the Department of Chemistry at Hokkaido University, Hokkaido, Japan, in 1970, received a master's from Hokkaido University in 1972 and received a doctorate from South Australia State Flinders University, Australia, in 1976.

From 1975 until his selection by NASDA, Mohri served in various positions with the engineering faculty in the Department of Nuclear Engineering at Hokkaido University. His major field of expertise is in surface physics and ultra-high vaccum science. Mohri's current residence is in Matsudo-shi, Chiba, Japan.

MISSION MANAGEMENT FOR STS-47

NASA Headquarters, Washington, D.C.
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Jeremiah W. Pearson III -- Associate Administrator
Brian O'Connor -- Deputy Associate Administrator
Tom Utsman -- Director, Space Shuttle
Leonard Nicholson -- Manager, Space Shuttle
Brewster Shaw -- Deputy Manager, Space Shuttle

Office of Space Science And Applications
Dr. Lennard A. Fisk -- Associate Administrator
Alphonso V. Diaz -- Deputy Associate Administrator
Robert Benson -- Director, Flight Systems Division
Gary McCollum -- Program Manager
Joseph Alexander -- Acting Director, Life Sciences Division
Dr. Thora Halstead -- Program Scientist
Robert Rhome -- Director, Microgravity Division
Dr. Robert Sokolowski -- Program Scientist

Office of Commercial Programs
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Richard H. Ott -- Director, Commercial Development Division
Garland C. Misener -- Chief, Flight Requirements and Accommodations
Ana M. Villamil -- Program Manager, Centers for the Commercial Development of Space

Office of Safety and Mission Quality
Col. Federick Gregory -- Associate Administrator
Dr. Charles Pellerin, Jr. -- Deputy Associate Administrator
Richard Perry -- Director, Programs Assurance

National Space Development Agency of Japan
Yoshihiro Ishizawa -- Executive Director
Kazuhiko Yoneyama -- Deputy Director
Tadaaki Mochida -- Director, Space Experiment Group
Norio Soichi -- Project Manager
Dr. Yoshinori Fujimori -- Project Scientist

Marshall Space Flight Center, Huntsville, Ala.
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Dr. J. Wayne Littles -- Deputy Director
J. Aubray King -- Mission Manager
Dr. Fred W. Leslie -- Mission Scientist

Ames Research Center, Moffett Field Calif.
Dr. Dale L. Compton -- Director
Victor L. Peterson -- Deputy Director
Dr. Joseph C. Sharp -- Director, Space Research

Ames-Dryden Flight Research Center, Edwards, Calif.
Kenneth J. Szalai -- Director
T. G. Ayers -- Deputy Director
James R. Phelps -- Chief, Shuttle Support Office

Kennedy Space Center, Fla.
Robert L. Crippen -- Director
James A. "Gene" Thomas -- Deputy Director
Jay F. Honeycutt -- Director, Shuttle Management and Operations
Robert B. Sieck -- Launch Director
John J. "Tip" Talone -- Endeavour Flow Director
J. Robert Lang -- Director, Vehicle Engineering
Al J. Parrish -- Director, Safety Reliability and Quality Assurance
John T. Conway -- Director, Payload Management and Operations
P. Thomas Breakfield -- Director, Shuttle Payload Operations
Joanne H. Morgan -- Director, Payload Project Management
Glenn E. Snyder -- STS-47 Payload Processing Manager

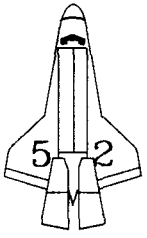
Marshall Space Flight Center, Huntsville, Ala.
Thomas J Lee -- Director
Dr. J Wayne Littles -- Deputy Director
Harry G. Craft -- Manager, Payload Projects Office
Aubray King -- Spacelab-J Mission Manager
Dr. Fred LesLie -- Spacelab-J Mission Scientist
Alexander A. McCool -- Manager, Shuttle Projects Office
Dr. George McDonough -- Director, Science and Engineering

James H. Ehl -- Director, Safety and Mission Assurance
Otto Goetz -- Manager, Space Shuttle Main Engine Project
Victor Keith Henson -- Manager, Redesigned Solid Rocket Motor Project
Cary H. Rutland -- Manager, Solid Rocket Booster Project
Parker Counts -- Manager, External Tank Project

Johnson Space Center, Houston
Aaron Cohen -- Director
Paul J. Weitz -- Acting Director
Daniel Germany -- Manager, Orbiter and GFE Projects
Donald Puddy -- Director, Flight Crew Operations
Eugene F. Kranz -- Director, Mission Operations
Henry O. Pohl -- Director, Engineering
Charles S. Harlan -- Director, Safety, Reliability and Quality Assurance

Stennis Space Center, Bay St. Louis, Miss.
Roy S. Estess -- Director
Gerald Smith -- Deputy Director
J. Harry Guin -- Director, Propulsion Test Operations

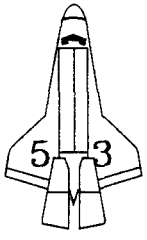
Upcoming Space Shuttle Flights



Columbia

1992
Pad 39-B

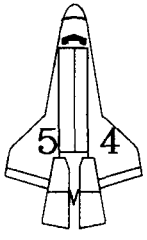
Launch targeted for September. Among payloads are LAGEOS-II, USMP-01, CANEX-02, ASP, IRIS. 28.5 degrees inclination/185 st. miles. Nine days. James D. Wetherbee; Michael A. Baker; William M. Shepherd; Tamara E. Jernigan; Charles Lacy Veach; Steve MacLean.



Discovery

1992
Pad 39-A

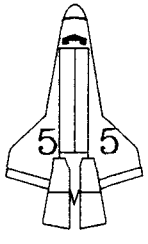
Launch targeted for December. Dedicated DOD mission. 57 degrees inclination/230 st. miles. Four days. Crew: David M. Walker; Robert D. Cabana; Guion S. Bluford; James S. Voss; Michael R. U. Clifford.



Endeavour

1993
Pad 39-B

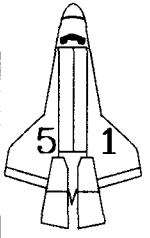
Launch targeted for January. Tracking and Data Relay Satellite-06. 28.5 degrees inclination/185 st. miles. Six days. Crew: John H. Casper; Donald R. McMonagle; Gregory J. Harbaugh; Mario Runco; Susan J. Helms.



Columbia

1993
Pad 39-A

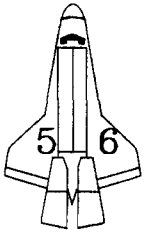
Launch targeted for March. SL-D2 (Second German Spacelab mission). 28.5 degrees inclination/185 st. miles. Nine days. Crew: Steve Nagel; Tom Henricks; Jerry L. Ross; Charles Precourt; Bernard A. Harris Jr.; Hans Schlegel; Ulrich Walter.



Discovery

1993
Pad 39-B

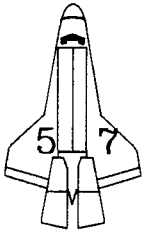
Launch targeted for April. Advanced Communications Technology Satellite; ORFEUS-SPAS. 28.5 degrees inclination/185 st. miles. Eight days. Crew: Frank L. Culbertson Jr.; William F. Readdy; Daniel W. Bursch; James H. Newman; Carl E. Walz.



Endeavour

1993
Pad 39-A

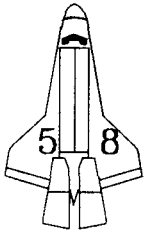
Launch targeted for May. Atlas-02, SSBUV, SPTN (x-ray astronomy experiment on free-flyer). 57 degrees inclination/185 st. miles. Nine days. Crew: Kenneth Cameron; Stephen S. Oswald; Kenneth D. Cockrell; Michael Foale; Ellen Ochoa.



Atlantis

1993
Pad 39-B

Launch targeted for June. EURECA retrieval. Spacehab-01. 28.5 degrees inclination/185 st. miles. Seven days. Crew: Ronald J. Grabe; Brian J. Duffy; G. David Low; Janice E. Voss; Nancy J. Sherlock; Peter J. K. "Jeff" Wisoff.



Columbia

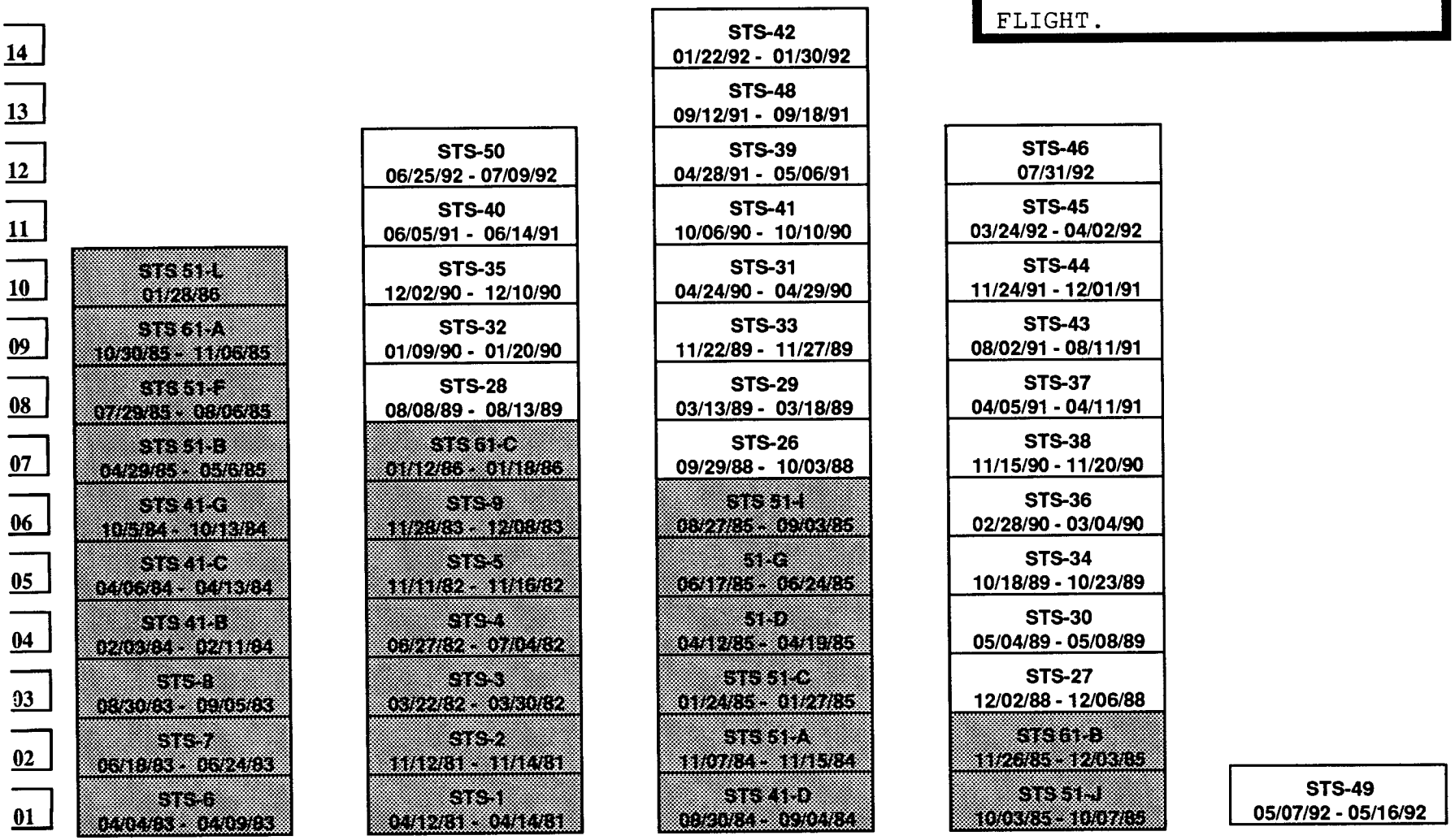
1993
Pad 39-A

Launch targeted for August. Spacelab Life Sciences-2. 39 degrees inclination/183 st. miles. Thirteen days. Crew: Commander and pilot TBD. Mission specialist crew members include: Rhea Seddon; Shannon Lucid; David Wolf.

SOME NOTES ON THIS SCHEDULE: This is an unofficial Space Shuttle launch schedule covering the period of September 1992 through August 1993. Crew listings name commanders first, then pilots, then mission and payload specialists. This flight listing is based on the January 1992 Mixed Fleet Manifest. This graph is prepared by the Kennedy Space Center Public Information Office and is dated July 28, 1992. Abbreviations used include: EPD = Earliest Possible Date. TBD = To Be Determined. Official launch dates are set at the Flight Readiness Review.

SHUTTLE FLIGHTS AS OF JULY 1992

49 TOTAL FLIGHTS OF THE SHUTTLE SYSTEM - 24 MISSIONS CONDUCTED SINCE RETURN TO FLIGHT.



NASA News

National Aeronautics and
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Washington, D.C. 20546
AC 202 453-8400

ISY

Ed Campion
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

Barbara Schwartz
Johnson Space Center, Houston
(Phone: 713/483-5111)

For Release
August 4, 1992

N92-72
NOTE TO EDITORS

SPACE SHUTTLE MISSION BRIEFINGS SET

Several Space Shuttle mission briefings have been scheduled for the media on August 10, 11, and 14.

STS-47 Spacelab-J preflight briefings will be held August 10-11 to provide background information on the life sciences and materials processing mission of NASA and the National Space Development Agency of Japan (NASDA). The schedule for the briefings follows:

Date	Time (EDT)	Briefing	Location
8/10	9 a.m.	Mission Overview Milt Heflin, Flight Director Aubray King, Mission Manager	 JSC MSFC
	10 a.m.	Science Overview Dr. Fred Leslie, Mission Scientist Dr. Yoshimori Fujimori, NASDA Project Scientist Others TBD	MSFC
8/11	9 a.m.	Astronaut Crew Briefing Robert L. "Hoot" Gibson, Commander Curtis L. Brown, Jr., Pilot Mark C. Lee, Payload Commander N. Jan Davis, Ph.D., Mission Specialist Jay Apt, Ph.D., Mission Specialist Mae C. Jemison, M.D., Mission Specialist Mamoru Mohri, Ph.D., Payload Specialist	JSC

-more-

11 a.m.	NASDA Press Conference Kazuhiko Yoneyama, Deputy FMPT Mission Executive Mamoru Mohri, Spacelab-J Payload Specialist	JSC

Note: This briefing will be in Japanese and will not be carried on NASA Select TV.

Round-robin interviews will be conducted with the astronaut crew following the briefings. Reporters wishing to participate in these interview sessions must notify the Johnson Space Center Newsroom by 5:30 p.m. EDT, Aug. 7. These interviews will not be broadcast on NASA Select TV.

****

The STS-46 postflight crew press conference will be held at the Johnson Space Center, building 2 news conference room, Friday, Aug. 14, at 4:30 p.m. EDT. Crew members will narrate photography from their current mission to deploy the European Retrievable Carrier satellite and to gather data on theTether Satellite System.

All briefings will be carried on NASA Select TV, except where noted, with two-way audio for Q&A from NASA Headquarters and NASA centers. NASA Select may be accessed through Satcom F2R, transponder 13, 72 degrees west longitude.

-end-

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For Release

Paula Cleggett-Haleim
Headquarters, Washington, D.C.
(Phone: 202/358-1547)

August 5, 1992

Susie Marucci
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/286-6256)

RELEASE: C92-11

HUBBLE SPACE TELESCOPE SUPPORT CONTRACTOR SELECTED

NASA's Goddard Space Flight Center, Greenbelt, Md., has selected Lockheed Missiles & Space Company, Inc., Sunnyvale, Calif., to negotiate a cost-plus-award-fee, level-of-effort contract for the Hubble Space Telescope (HST) Mission Operations, Systems Engineering and Software (MOSES) effort. The Lockheed Missiles & Space Company's contract will be in excess of $100 million and is a follow-on to existing, expiring contracts.

The proposed effort includes maintenance of the spacecraft's health and safety, efficient operation of the observatory, systems management and servicing mission support.

The Hubble Space Telescope was deployed from the Space Shuttle Discovery on April 25, 1990. HST was designed to study the universe in near-infrared, visible and ultraviolet wavelengths. The HST servicing mission, currently scheduled for December 1993, is planned to replace one of the HST instruments and install a corrective optics instrument, a new solar array and gyro assembly units.

-end-

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For Release

Paula Cleggett-Haleim
Headquarters, Washington, D.C.
(Phone: 202/358-1547)

August 10, 1992

Randee Exler
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/286-7277)

N92-71
NOTE TO EDITORS

NASA STATEMENT ON EARTH DATA SYSTEM PROPOSALS

NASA today issued the following statement regarding the Earth Observing System Data and Information System Core System acquisition:

NASA CALLS FOR REVISED PROPOSALS FOR THE EARTH OBSERVING DATA AND INFORMATION SYSTEM CORE SYSTEM ACQUISITION

The government has completed its evaluation of proposals received for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) Acquisition. ECS will, over the 10-year period of the contract, be a geographically distributed system supporting the operations and management of the Earth Observing System in-orbit payloads and other U.S. Earth observing spacecraft. ECS will support the acquisition, processing, archival and distribution of EOS data and selected non-EOS data (e.g., Earth probe data systems, pathfinder data sets) and will facilitate a wide range of scientific research.

As prescribed by NASA source selection regulations, the evaluation of proposals included a "most probable cost" analysis of each proposal as reflected in the "best and final offers" submitted by the offerers. Despite NASA's repeated attempts during the solicitation and evaluation processes to encourage the submission of realistic cost estimates, the government's analysis clearly indicates that the offerers significantly underestimated the cost of the respective technical approaches. Accordingly, NASA is unwilling to select an offerer for further negotiations leading to award of a contract.

-more-

Extensive analysis of the proposed technical approaches shows that the proposals reflect sound technical approaches and exhibit a reasonable understanding of the program to be accomplished. Whatever the reason for the underestimation of cost, the end result is unrealistic cost proposals that do not provide a satisfactory basis for constructive negotiations.

NASA has elected, therefore, to offer an additional opportunity for offerers in the competitive range to adjust the proposed costs to a more realistic level. In instructions issued by the Goddard Space Flight Center on Aug.10, 1992, as an amendment to the solicitation, NASA has directed the offerers to submit revised cost proposals. Changes to the previously submitted technical and business management proposals will not be considered.

In addition, Goddard Space Flight Center has provided the offerers with the provision that will be used to evaluate the contractor's cost performance during the contract period. This provision assesses significant reductions to the award fee if the contractor fails to manage and control the program in accordance with the costs proposed.

Revised cost proposals that realistically reflect the requirements of the solicitation and the proposed technical approach are to be submitted by 1 p.m. EDT on Aug. 31, 1992. By the end of September 1992, NASA intends to select an offerer for negotiations leading to contract award.

-end-

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For Release

Mark Hess
Headquarters, Washington, D.C.
(Phone: 202/453-4164)

August 11, 1992

Jerry Berg
Marshall Space Flight Center, Huntsville, Ala.
(Phone: 205/544-0034)

RELEASE: 92-129

TETHERED SATELLITE INVESTIGATION UNDERWAY

A Board of Investigation has been formed to assess the problems that occurred during the first mission of the Tethered Satellite System (TSS) during Shuttle mission STS-46. The board was appointed by Jeremiah W. Pearson, Associate Administrator, Office of Space Flight, NASA Headquarters.

The board is chaired by Darrell Branscome, Chief Engineer at the NASA Langley Research Center, Hampton, Va. Other members include:

- Gianfranco Manarini, Italian Space Agency
- Bill J. Comer, Office of Safety and Mission Quality, HQ
- William G. Mahoney, Payload Operations, KSC
- John A. Wegener, Mission Operations, JSC
- James M. McMillion, Flight Systems, MSFC
- Thomas D. Stuart, Office of Space Flight, HQ (observer)

"The board is authorized to take all necessary action to review the anomalies associated with the TSS problems to determine the probable cause and recommend corrective measures to prevent reoccurrence," Pearson said.

An initial report of the review findings, supporting data and analysis are to be submitted to Pearson by August 28, 1992.

-more-

All relevant flight hardware and data that team members will need to examine are being maintained in the "as flown" condition. Tethered Satellite System hardware removed from Atlantis following its landing is being kept in a secure location at the Kennedy Space Center, Fla. Data obtained during the mission, as well as pertinent data gathered during development and testing phases of the Tethered Satellite program, is being preserved with no alteration.

The Board of Investigation is supported by the TSS Systems Working Group based at the Marshall Space Flight Center (MSFC), Huntsville, Ala., and by any other MSFC elements the board may require.

The Tethered Satellite System-1 mission was a joint project of NASA and the Italian Space Agency.

-end-

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For Release

Paula Cleggett-Haleim
Headquarters, Washington, D.C.
(Phone: 202/358-1547)

August 13, 1992

Mark Hess
Headquarters, Washington, D.C.
(Phone: 202/453-4164)

NOTE TO EDITORS: N92-72

NASA'S HUMAN FACTORS EXHIBIT ON DISPLAY FRIDAY

For the first time, information will be presented publicly on NASA's space human factors research conducted on the Spacelab Life Science-1 mission, flown in June 1991, and the International Microgravity Laboratory-1, flown in January 1992.

NASA's Human Factors Program will be featured at the centennial meeting of the American Psychological Association on Friday, Aug. 14, 10:00 a.m. to 5:00 p.m. EDT, at the Omni Shoreham Hotel, 2500 Calvert Street, N.W., Washington, D.C.

The space human factors program addresses the psychological and behavioral factors of crew members on future missions. Through this program, design requirements, protocols and procedures are developed to ensure the psychological well-being, safety and enhanced productivity of space crews.

Also presented will be ground research on astronaut selection criteria, team performance and group productivity, automation, computer modeling and virtual reality.

Posters, video and audio presentations and interactive displays will be available in the Garbo Room of the Omni Shoreham Hotel.

Space life sciences research began in 1960 with the goal of enabling human survival in space. As NASA moves to a new era in space -- extended human exploration and permanent settlement of space -- the focus of life sciences research has evolved to ensure human health and productivity on space missions, on the Space Shuttle in the 1990s, then on Space Station Freedom and ultimately on the Moon and Mars.

- end -

NASA News

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For Release

Paula Cleggett-Haleim
Headquarters, Washington, D.C.
(Phone: 202/358-0883)

August 13, 1992
2:00 p.m. EDT

Jane Hutchison
Ames Research Center, Mountain View, Calif.
(Phone: 415/604-9000)

RELEASE: 92-130

SPACELAB STUDIES FEATURE FROG EGGS AND SPACE MOTION SICKNESS

How will frog eggs develop in the weightlessness of space flight? Can astronauts learn to control the symptoms of space motion sickness?

Scientists from NASA's Ames Research Center, Mountain View, Calif., will seek answers to these and other questions during the next Space Shuttle flight in early September. Their experiments are part of the Spacelab-J mission, a 7-day joint space venture of the United States and Japan.

Tadpole Development in Space

Kenneth A. Souza, Principal Investigator for the frog embryology experiment, said fertilized amphibian eggs -- unlike those of most organisms -- show an obvious response to gravity. His experiment should answer a basic biological question: whether gravity is essential for the normal fertilization of frog eggs and the early development of frogs.

The frog egg is a small, 1-2 millimeter (.04 to .08 inch) spherical cell, clearly divided into a darkly pigmented hemisphere and a lightly colored hemisphere rich in yolk. On Earth, fertilized frog eggs always orient themselves when fertilized so the heavy, lightly pigmented hemisphere is at the "bottom" of the egg, Souza said.

Although frog eggs were studied previously in space, "This is the first time we can fertilize them in space and watch their development through hatching," Souza said. "The stage most sensitive to gravity changes and the stage at which the symmetry -- left, right and head-tail location -- of the frog is established occurs shortly after fertilization. This critical stage was missed by previous spaceflight studies."

- more -

Four female South African clawed frogs will be carried into space in a special "frog box." Early in the mission, a crew member will inject the frogs with a hormone which stimulates them to shed their eggs. A sperm solution will be added later to fertilize the eggs.

Some of the eggs will develop under the microgravity of space flight. Others will develop on an onboard centrifuge that creates a gravity force equal to Earth's. A video camera in the Shuttle will allow Souza and his collaborators to observe the eggs as they develop from eggs to tadpoles.

The scientists will study the embryos and tadpoles after the flight to compare them with others developed on Earth. Dr. Muriel Ross, a neurobiologist at Ames, will study the development of balance organs in the inner ear. Dr. Richard Wassersug of Dalhousie University, Halifax, Nova Scotia, will observe the swimming pattern and behavior of the tadpoles. Dr. Steven Black of Reed College, Portland, Ore., will compare the development of embryos grown under weightless conditions to those given simulated gravity on the on-board centrifuge.

Easing Space Motion Sickness

Spacelab-J will offer another opportunity to look at alleviating the symptoms of space motion sickness. Ames scientist Dr. Patricia Cowings and her colleagues will test the effectiveness of autogenic feedback training (AFT) in easing the symptons of motion sickness. Cowings developed AFT -- a combination of biofeedback and autogenic therapy (a learned, self-regulation technique) -- at Ames.

Cowings, who first successfully tested the technique on two astronauts during a Space Shuttle flight in 1985, said AFT has several advantages over using medication to treat motion sickness symptoms.

"AFT produces relief with as little as 6 hours of training and it reduces the behavioral and physiological reactions to even the most provocative motion sickness stimuli," she said. "In addition, there are no side-effects such as sleepiness, reduced short-term memory or blurred vision, as there may be with drugs." Cowings added that AFT is effective in a wide range of individuals and people remember the training a long time.

Over the past 19 years, Cowings has trained more than 200 individuals, including military pilots, in autogenic feedback. She observed significant improvement in motion tolerance in 85 percent of them.

During the Spacelab-J mission, two crew members will wear special instruments to record their physiological responses as they move about the Spacelab and carry out normal mission tasks. A portable, battery-powered monitoring system worn on the belt will record such physiological measurements as skin temperature, respiration rate and the heart's electrical currents. One crew member is AFT-trained. Another, non-AFT-trained, crew member serves as a control.

"If we're to have a permanent presence in space, we must know how gravity affects the development of life at the cellular level," said Sally Schofield, Ames' payload scientist. "We also must understand how people adapt to microgravity and find ways to ease this process. Ames' experiments address these issues."

Greg Schmidt, Ames' payload manager, said his team is anxious to get the mission under way. "Thirty people at Ames have worked for over 8 years getting ready for this mission," he said. "We are very excited about our role in this international mission. We're ready to go."

Souza, Chief of Ames' Space Life Sciences Payloads Office, said the Spacelab-J mission will be his office's third major life science mission in about a year.

- end -

NOTE TO EDITORS: Two videos and three still photos to accompany this release are available to news media representatives by calling the NASA Broadcast and Imaging Branch, 202/453-8373.

The videos are unnarrated, but each has a brief interview with the principal investigator at the end.

Videos:

Frog Embryology Experiment (12:11 min.)
Autogenic Feedback Training Experiment (8:15 min.)

Photos:

	Color	B&W
Frog Embryology Experiment	92-HC-470	92-H-525
Frog Environmental Unit	92-HC-471	92-H-526
Autogenic Feedback System	92-HC-472	92-H-527

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For Release

Donald L. Savage
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

Aug. 14, 1992

NOTE TO EDITORS: N92-74

MARS OBSERVER SCIENCE BRIEFING SCHEDULED AUG. 19

A media briefing focusing on the scientific aspects of NASA's upcoming Mars Observer mission is scheduled for 1 p.m. EDT, Wednesday, Aug. 19, 1992. The briefing will be held in the 6th floor auditorium (rm. 6004), 400 Maryland Ave., S.W., Washington, D.C.

Mars Observer is set for launch Sept. 16 from Cape Canaveral Air Force Station, Fla. The spacecraft will be launched aboard a Titan III rocket with a Transfer Orbit Stage upper stage. Following an 11-month cruise, the spacecraft will enter orbit around Mars. The spacecraft will use its 7 instruments to make a comprehensive and detailed study of the planet's atmosphere, surface and interior over the course of 1 full Martian year (687 Earth days). Mars Observer is the first U.S. mission to Mars since Viking in 1977.

Participants will be:

- Dr. Wesley Huntress, Director, Solar System Exploration Division, NASA Headquarters, Washington, D.C.
- Dave Evans, Project Manager, Jet Propulsion Laboratory, Pasadena, Calif.
- Arden Albee, Project Scientist, California Institute of Technology, Pasadena, Calif.
- Michael Malin, Principal Investigator, Mars Observer Camera, Malin Space Science Systems, San Diego
- Michael Carr, Interdisciplinary Scientist, Geosciences, U.S. Geological Survey, Menlo Park, Calif.
- Andrew Ingersoll, Interdisciplinary Scientist, Polar Atmospheric Science, California Institute of Technology

The briefing will be carried live on NASA Select television (Satcon F2R, transponder 13, 72 degrees west longitude) with remote Q. and A. capability.

- end -

Radio and television reporters planning live coverage directly from WSMR must submit their transmission frequencies to Debbie Bingham by Sept. 3 to obtain clearance for their use.

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For Release

Brian Dunbar
Headquarters, Washington, D.C.
(Phone: 202/358-0873)

August 20, 1992

Keith Koehler
Wallops Flight Facility, Wallops Island, Va.
(Phone: 804/824-1579)

RELEASE: 92-135

NASA STUDYING PACIFIC OCEAN PLANT PRODUCTIVITY

NASA researchers will begin a 3-week airborne study on Aug. 20 to increase understanding of microscopic plant productivity in the equatorial region of the Pacific Ocean.

Dr. Frank Hoge, principal investigator from Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Va., said the principal scientific objective is to understand why microscopic plant productivity is so limited in the Pacific compared to the Atlantic Ocean.

Microscopic plants, called phytoplankton, are an important part of the marine food chain as nutrition for small animals and fish. Phytoplankton also plays an important role in the absorption of carbon dioxide from the atmosphere. Carbon dioxide is a "greenhouse gas" that traps heat near the Earth's surface. Increasing concentrations of carbon dioxide in the last 100 years, primarily through humans' use of fossil fuel, has led to concerns that human activity may be increasing the Earth's temperature.

Hoge points out that the Pacific Ocean equatorial region has amounts of nutrient concentrations, sunlight and phytoplankton seed similar to those found in the Atlantic Ocean. However, phytoplankton in the Atlantic is more abundant than in the Pacific, he said.

The NASA-Wallops researchers will conduct their study during four flights at 500 feet (152 meters) altitude, slightly less than the height of the Washington Monument, using the Airborne Oceanographic Lidar (AOL) and other instruments aboard Wallops' P-3B aircraft. The flights are expected to last about 12 hours each.

- more -

The Wallops instruments on the aircraft allow researchers to survey large stretches of the Pacific Ocean. Hoge said the researchers will use active and passive data-collection techniques to help them develop analytical tools for future satellites that will map phytoplankton concentrations on a world-wide scale.

In addition to measuring the phytoplankton, the researchers also will measure dissolved organic matter in the ocean. Hoge said the organic matter interferes with gathering accurate satellite phytoplankton measurements.

The AOL transmits a green light pulse from a laser into the water where the light is absorbed by the phytoplankton. A receiver on the aircraft detects the green light reflected from the water surface and red light which is emitted by chlorophyll pigment in the phytoplankton.

At the same time, another instrument on the aircraft is taking measurements from sunlight reflected from the water and light emitted by the chlorophyll. Satellites, which lack the facilities to power a laser system, measure changes in ocean color that indicate where concentrations of phytoplankton are located.

Wallops researchers will base their flights from Hilo, Hawaii. They will fly to 140 degrees west longitude and 5 degrees north of the equator. Measurements will be taken in conjunction with the University of Washington scientific research vessel "Thomas G. Thompson."

Once the P-3 aircraft reaches 3 degrees south of the equator, the P-3 will turn toward the west taking measurements on both sides of the equator as the plane advances towards Christmas Island.

The NASA project is part of the Joint Global Ocean Flux Study supported by the National Science Foundation, Washington, D.C. The project is managed by Wallops for NASA's Office of Space Science and Applications, Washington, D.C.

- end -

NASA News

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For Release

Terri Sindelar
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

August 21, 1992

NOTE TO EDITORS: N92-75

GOLDIN TO WELCOME LARGEST GATHERING OF SPACE EXPLORERS

NASA Administrator Daniel S. Goldin will deliver the opening remarks at the Association of Space Explorers (ASE) 8th Planetary Congress. This will be the largest group of astronauts and cosmonauts ever assembled with over 100 international space flyers, representing 19 nations, expected to attend.

The Congress opens Monday, Aug. 24, 9 a.m. EST, at Gaston Hall, Georgetown University, Washington, D.C.

The theme for this week-long meeting is "To Mars Together." Through public and executive sessions, the world's space explorers will discuss the various aspects of an international mission to Mars.

In addition to the opening ceremony, Congress highlights include:

Monday, Aug. 24, 1 p.m. *"To Mars Together"* panel discussion with Mike Griffin, Associate Administrator of NASA's Office of Exploration; Konstantin Feoktistov, Cosmonaut; Carl Sagan, The Planetary Society; and Valentina Tereshkova, Cosmonaut.

Tuesday, Aug. 25, 1 p.m. Press conference at the Leavey Center.

Friday, Aug. 28, 5:30 p.m. Joint public lecture with The Planetary Society; and at **9 p.m.** ASE awards banquet honoring Isaac Asimov.

Saturday, Aug. 29, 10 a.m. to Noon and 2 to 4 p.m. The public is invited to meet and hear discussions by international space flyers. The free Community Day will be held at Reiss Science Building, Georgetown University. Featured speakers include Mercury astronaut Scott Carpenter, Gemini astronaut Pete Conrad, Space Shuttle astronaut Fred Gregory, and Commonwealth cosmonauts Alexei Leonov (first human to walk in space) and Svetlana Savitskaya (first woman to walk in space).

- more -

During Community Day, the Challenger Center will assist 100 students in assembling "Marsville-The Cosmic Village." Students will create an inflatable habitat and life support systems needed for living on Mars.

For press accreditation, contact the ASE press office through the Leavey Conference Center, Georgetown University, on 202/687-3291.

- end -

NASA News

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Mark Hess
Headquarters, Washington, D.C.
(Phone: 202/453-4164)

Karl Kristofferson
Kennedy Space Center, Fla.
(Phone: 407/867-2468)

For Release
August 24, 1992

RELEASE: C92-12

MARYLAND FIRM SELECTED FOR CONTRACT NEGOTIATION

NASA's John F. Kennedy Space Center, Fla., has selected I-Net, Inc., Bethesda, Md., for negotiation of a contract to provide engineering support services to the center's Engineering Development Directorate.

The period of contract performance is 5 years, beginning Oct. 1, 1992, and has an estimated value in excess of $100 million.

Under terms of the contract to be negotiated, I-Net, Inc., will provide a broad base of engineering services which may range in scope from technical manpower in support of a variety of government laboratories to engineering and management of complex applied research and technology projects. This includes engineering studies and investigations; conceptual, preliminary, detail and development engineering; and documentation support and maintenance.

The contract was competed nationally as a small, disadvantaged business set-aside.

-end-

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ISY

For Release

Debra J. Rahn
Headquarters, Washington, D.C.
(Phone: 202/358-1639)

August 25, 1992

N92-76
NOTE TO EDITORS

GOLDIN TO ADDRESS SAFISY MEETING

Daniel S. Goldin, NASA Administrator, will address the fifth meeting of the Space Agency Forum on the International Space Year (SAFISY), Loews L'Enfant Plaza Hotel, Ballrooms A-C, Washington, D.C., Aug. 28-29, 1992.

SAFISY is composed of 29 members (national and multi-national space agencies) and 10 affiliate members (international, space-related organizations). Each of these agencies will be represented at this final meeting to review the progress of the various SAFISY-sponsored international space year projects and discuss options for post-1992 cooperation.

News media representatives are welcome to attend the opening session of the meeting on Aug. 28, 9-10:30 a.m. The speakers are:

9:00 a.m. Welcome: Margaret G. Finarelli, Associate Administrator for Policy Coordination and International Relations, NASA
9:05 a.m. Keynote Address: Daniel S. Goldin, NASA Administrator
9:30 a.m. Opening Remarks: Ray Kammer, Deputy Undersecretary, Oceans and Atmosphere, Dept. of Commerce, NOAA
9:45 a.m. Opening Remarks: Hubert Curien, Minister for Research and Space, France
10:00 a.m. Opening Remarks: Kanzo Tanigawa, Minister of State for Science and Technology, Japan

Media representatives planning to attend the meeting should contact Debra Rahn.

These presentations will be taped and replayed on NASA Select TV, Satcom F-2R, transponder 13, on Monday, Aug. 31, 1992, at a time to be announced.

-end-

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 453-8400

ISY

For Release

Drucella Andersen
Headquarters, Washington, D.C.
(Phone: 202/453-8613)

August 25, 1992

Mike Fetters
National Air and Space Museum, Washington, D.C.
(Phone: 202/357-1663)

EDITORS NOTE: N92-77

ROBOT PARADE/PRESS PREVIEW SET FOR THE MALL

Media representatives are invited to a robot parade and press preview on Monday, Aug. 31, at 11 a.m EDT. NASA Administrator Daniel Goldin, National Air and Space Museum Director Martin Harwit, Planetary Society Executive Director Louis Friedman and representatives from the Russian Space Agency will be on hand to answer questions.

The parade of the largest gathering of interplanetary rovers will begin on the Mall, across 4th Street, S.W., near the National Air and Space Museum and end with the robots filing into a tent that will house them during a Rover Expo. Sixteen vehicles, ranging in size from 4 pounds to 3 tons, will be on display. The rovers include NASA's "Dante" which is scheduled to go to Antartica in November to explore Mt. Erebus, an active volcano.

Walkers, crawlers and wheeled rovers will be on the Mall, Sept. 1-2, during the International Space Year Exhibition of Robots for Exploring New Worlds. Each day, from 10 a.m. to 6 p.m., rovers will demonstrate their capabilities on a 24- by 40-foot simulated Mars terrain, located one block east of the National Air and Space Museum. The expo is free and open to the public.

- end -

NASA News

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For Release

Mark Hess
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August 27, 1992

Barbara Schwartz
Johnson Space Center, Houston
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RELEASE: 92-136

CREW ASSIGNMENTS ANNOUNCED FOR STS-58 AND STS-61

John E. Blaha (Col., USAF) will command the Spacelab Life Sciences-2 Space Shuttle mission STS-58 scheduled for launch next summer. This mission will continue life sciences research on adaptation to microgravity in preparation for Space Station Freedom and future planetary exploration. Blaha is a veteran of three previous Space Shuttle missions, as Pilot on STS-29 in March 1989 and STS-33 in November 1989 and as Commander on STS-43 in August 1991.

Pilot on STS-58 is Richard A. Searfoss (Maj., USAF), a member of the 1990 astronaut class. This is Searfoss' first flight. William S. McArthur, Jr., (Lt. Col., USA), also from the astronaut class of 1990 and assigned to his first flight, will be a mission specialist.

Previously assigned crew members are Payload Commander M. Rhea Seddon, M.D., assigned in October 1991, and mission specialists Shannon Lucid, Ph.D., and David Wolf, M.D., both assigned in December 1991.

Three mission specialists with spacewalking experience are named to join Payload Commander Story Musgrave, M.D., on STS-61 Hubble Space Telescope servicing mission scheduled for late 1993.

They are Tom Akers (Lt. Col., USAF) who flew on STS-41 in October 1990 and STS-49 in May 1992; Jeffrey A. Hoffman, Ph.D., who flew on STS-51-D in April 1985, STS-35 in December 1990 and STS-46 in August 1992; and Kathryn C. Thornton, Ph.D., who flew on STS-33 in November 1989 and STS-49 in May 1992.

- end -

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August 28, 1992

TETHER INVESTIGATION STATUS REPORT 1

The Tethered Satellite System (TSS) Investigative Board today presented an interim status report to Space Flight Associate Administrator Jeremiah Pearson.

Board Chairman Darrell Branscome reported the team is focusing on 5 problems that occurred during the deployment of the Tethered Satellite System on Space Shuttle mission STS-46. Those problems are:

o Failure of the No. 2 umbilical to retract from the tethered satellite
o Failure of the satellite to deploy on the first "flyaway" attempt
o The unplanned stop of the satellite at 179 meters
o The unplanned stop of the satellite at 256 meters
o Inability to either deploy or retrieve the satellite at 224 meters.

The tethered satellite has been removed from the orbiter Atlantis and placed in a checkout stand in the Operations and Control facility at the Kennedy Space Center, Fla. The Board had its first look at TSS hardware this week.

Detailed inspection of the tether reel assembly provided evidence that the unplanned stops at 179 and 256 meters were due to a mechanical obstruction.

Visual evidence and preliminary analysis point to a 1/4-inch diameter bolt which prevented part of the reel mechanism from freely traveling back and forth. The level wind mechanism, which operates similar to the way a fishing reel feeds out line, contacted the end of the bolt preventing it from moving all the way out to its stopping point.

The bolt is part of a structural modification that was installed on the reel assembly earlier this year. The modification was required following the final computer analysis which is done for every Shuttle mission to verify that all structural connections between the payload and orbiter will withstand the rigors of launch and landing.

-more-

Engineers require that attach points such as these be at least twice as strong as necessary to pass stringent safety criteria. Analysis indicated the margin of safety was less than that for some fasteners at the point where the reel assembly was mounted to its specially adapted support structure. The modification strengthened the mounting area to provide the required factor of safety.

Testing of the flight hardware is planned to verify that this mechanical obstruction was the cause of the jamming of the deployment reel and the subsequent unplanned stops of the satellite at 179 and 256 meters.

The Board believes that even without the problems with the umbilical and the jamming of the tether at the upper tether control mechanism, this problem would have prevented full deployment of the tethered satellite.

Branscome said the board is continuing work to identify causes for the other anomalies: the umbilical problem; the first "flyaway" attempt; and the jamming at 224 meters. The next interim report is expected to be complete in about a month.

-end-

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ISY

For Release

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Headquarters, Washington, D.C.
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August 28, 1992

RELEASE: 92-137

GOLDIN ANNOUNCES MORE STEPS TO HELP SMALL BUSINESS

NASA Administrator Daniel S. Goldin has announced that he will upgrade the position of Small and Disadvantaged Business Director to Assistant Administrator, equal to directors of program and administrative offices.

Goldin called the decision "a strong signal" in a series of moves to insure that the nation's small firms, including those owned by members of minorities and women, win a larger share of NASA contracts. He made the announcement at a small business conference in Nashua, N.H.

"In the past, we have focused much of our attention on working with the giant aerospace companies with the big hardware contracts and comparatively little on working with small business," Goldin said.

New Orientation

"We must change our orientation," he declared, stating that NASA has begun the process through a series of procurement initiatives.

One of the most important changes, Goldin said, is an action to reduce drastically the amount of paperwork and other administrative tasks now required to win smaller contracts.

"We are looking at 10-page requests for proposals and contracts versus 90-to-100 page documents," Goldin said.

The biggest change to help small businesses could come in mid-range procurements between $25,000 and $500,000, Goldin said. Although they represent only 15 percent of NASA's contract dollar, they account for more than 80 percent of the procurement actions.

-more-

Other Steps Outlined

Other steps Goldin has directed the agency to take to bolster awards to small firms include:

o Requiring prime contractors to increase the percentage of subcontracts with small and disadvantaged businesses (SDBs).

o Establishing a firm agency percentage for SDB awards in competitive procurements instead of a mere goal.

o Making subcontracting to small firms an important evaluation factor in source selection.

o Rewarding primes that exceed their subcontracting goals.

o Establishing a "Minority Business Resource Advisory Committee" within NASA to help SDBs deal with the agency.

o Pursuing statutory authority to allow the agency to make SDB set-asides.

Obstacles Must Come Down

"NASA must take down the obstacles that discourage so many small businesses from engaging in government contracting, " Goldin said. "We must make our requirements and our contracting process more accessible. We cannot bury you in forms, certifications, contract clauses and reporting requirements."

Goldin stated that NASA made direct awards to small firms of $870 million in fiscal year 1991, while another $1.4 billion flowed to small firms through subcontracting.

"We are convinced we can do more," he declared.

NASA's Kennedy Space Center (KSC), Fla.,currently is evaluating proposals for a $2.7 billion base operations contract and has declared that 30 percent of this must be subcontracted to small, disadvantaged or women-owned businesses.

Recently, KSC selected a minority-owned firm for a $75 million contract with options up to $150 million.

High-Tech Activities

"The contract is not for routine support services," Goldin noted. "It is for applied research and technology, including tasks involving telerobotics and development of a highly sensitive spectrometer to detect hazardous gas."

The Marshall Space Flight Center in Huntsville, Ala., expects to award a $35 million contract to a minority firm in late September, he said.

Goldin said that small firms have been great sources of innovation for NASA. He disclosed that a recent recipient of a NASA Small Business Innovative Research contract had developed "three dimensional packaging technology" for integrated circuit dies.

"This may ultimately lead to a sugar cube sized personal computer," Goldin said. "That company is now working with IBM to develop this product for the commercial marketplace."

NASA's Office of Small & Disadvantaged Business Utilization is headed by Eugene D. Rosen, who has the title of Director.

- end -

NASA News

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For Release

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August 31, 1992

Randee Exler
Goddard Space Flight Center, Greenbelt, Md.
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RELEASE: 92-138

NASA SATELLITE DETECTS NEW, EXTREME ULTRAVIOLET SOURCES

An object emitting extreme ultraviolet light located outside the Milky Way galaxy was detected by a NASA satellite through interstellar gas and dust, once thought to block this source of radiation. This discovery ssures that astronomers will have a new tool to probe the universe.

Also, EUVE has detected a new source of extreme ultraviolet radiation (EUV) from the corona of a star much like the sun, located about 16 light years from Earth. A white dwarf companion star also appears in the photograph released today.

On July 8 and 9, NASA's Extreme Ultraviolet Explorer (EUVE) measured an outburst from a "cataclysmic variable," a closely orbiting pair of stars in which gravitational forces pull matter from the outermost layers of a normal star onto the surface of a white dwarf companion. The hot, compressed stellar material generates an explosive burst of extreme ultraviolet radiation as the material falls into the deep gravitational field of the white dwarf.

Other explosive events are flares on stars. These are unpredictable, giant versions of eruptions known to occur on a smaller scale on our own sun. EUVE caught two such events on the red dwarf stars called AT Microscopium and AU Microscopium.

Also, EUVE astronomers were surprised when they detected an object located outside our own Milky Way galaxy that was emitting extreme ultraviolet radiation (EUV). At one time, astronomers had thought that the interstellar medium, the gas and dust spread throughout the galaxy, effectively would block their view of even nearby objects, because it is highly opaque to EUV radiation.

- more -

Each first view in a new spectral band gives astronomers a new tool to probe the universe. The EUV window is one of the last unexplored spectral regions.

EUVE Principal Investigators Professor Stuart Bowyer and Dr. Roger Malina, of the University of California at Berkeley's Center for Extreme Ultraviolet Astrophysics (CEA), presented the findings today to space scientists at the World Space Congress in Washington, D.C.

According to Professor Bowyer, initiator of the EUV program at Berkeley, "Years ago a lot of our colleagues thought we were crazy to observe in the EUV. Everyone "knew" that trying to look through the interstellar medium at these wavelengths would be like trying to use a telescope in a San Francisco fog."

Extreme ultraviolet (EUV) radiation is visible only to instruments above Earth's atmosphere. Radiation at these energies is emitted by multi-million degree coronae on stars, by giant eruptions on novae, by the hot surfaces of white dwarfs and by other exotic sources in the cosmos.

The EUVE was launched June 7, 1992, to study the extreme ultraviolet, the part of the electromagnetic spectrum lying between optical and x-ray wavelengths. It represents NASA's 67th Explorer mission. The first Explorer was launched on Jan. 31, 1958, and it discovered the Van Allen radiation belts.

The EUVE satellite, now 6 weeks into a survey of the entire sky, will provide astronomers with their first detailed maps in multiple EUV energy bands.

Officials at NASA's Goddard Space Flight Center, Greenbelt, Md., report that the satellite has functioned smoothly since its launch. All instruments are performing at or above expected levels, and data analysis is 50-percent ahead of schedule.

The EUVE Science Operations Center, based at CEA, operates around the clock, sending commands to point the instruments at selected astronomical sources and recording the findings of the satellite's four telescopes and three spectrometers. The CEA has adopted a novel approach for operating the project with a staff that includes more than two dozen undergraduate students who are getting a unique hands-on educational experience.

Researchers and engineers are studying the calibration and check-out data obtained during the first 6 weeks of the mission. These data serve a dual purpose. They verify the instrument performance and at the same time, give astronomers valuable new measurements to test their models.

NASA's Guest Observer Program begins at the conclusion of the 6-month sky survey. Scientists from around the world have applied to NASA to use the capabilities of the EUVE spectrometers. Stiff competition will assure that only the very best of the 140 submitted proposals will result in allocated observing time.

Goddard is responsible for the design, construction, integration, checkout and operation of EUVE. The spacecraft's science instrumentation was designed, constructed and calibrated by the Space Science Laboratories of the University of California, Berkeley. The EUVE is managed by Goddard for NASA's Office of Space Science and Applications, Washington, D.C.

- end -

Editors Note: A photograph is available to media representatives by calling NASA's Broadcast And Imaging Branch on 202/453-8373.

Color	B&W
92-HC-597	92-H-653

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Mitch Varnes
Kennedy Space Center, Fla.
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For Release
September 1, 1992

STS-47 LAUNCH ADVISORY

NASA TO LAUNCH JOINT U.S./JAPANESE FLIGHT SEPTEMBER 12

NASA has targeted the launch of the Space Shuttle Endeavour on a joint U.S./Japanese mission on Sept. 12, 1992, pending resolution of a technical problem in connection with an oxygen line in the orbiter's main propulsion system. If the problem is not resolved by the end of the week, managers will reassess the launch date.

Endeavour's 7-member crew will be launched from the Kennedy Space Center, Fla., during a window that extends from 10:23 a.m. to 2:17 p.m. EDT. The 6-day, 20-hour and 36-minute mission will end with a landing on Sept.19 at the Kennedy Space Center.

STS-47, also called Spacelab J, will be the 50th launch of the Space Shuttle and the second for Endeavour. Aboard the orbiting laboratory will be 43 experiments provided by Japan and the U.S. Astronaut Robert L. "Hoot" Gibson, making his fourth flight, will be the Mission Commander. The Pilot is Curtis L. Brown, Jr. Mission specialists are Mark Lee, Jay Apt, N. Jan Davis and Mae C. Jemison. Japan's Mamoru Mohri will be the Payload Specialist.

Spacelab J's primary objective is to use the space environment to study important scientific and technical questions in materials science, life science and technology.

-end-

NASA News

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For Release

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September 1, 1992

Del Harding
Ames Research Center, Mountain View, Calif.
(Phone: 415/604-9000)

RELEASE: 92-139

NASA SELECTS CRAY RESEARCH FOR SUPERCOMPUTER CONTRACT

NASA has selected Cray Research, Inc., Eagan, Minn., for negotiations leading to award of a contract to provide a new supercomputer to NASA's Ames Research Center, Mountain View, Calif. Estimated value of the contract is $74.3 million.

"Cray is an acknowledged pioneer in the supercomputer field," said Kristin Hessenius, Director of Aeronautical Research at NASA Headquarters, Washington, D.C. "They were chosen because of the clearly superior capabilities of the Y-MP C-90 and Cray's history of providing NASA with reliable, cost-effective facilities over the years."

The Y-MP C-90 will support Ames' Numerical Aerodynamic Simulation (NAS) Processing System Network. NAS serves hundreds of federal, private industry and university scientists throughout the United States. NAS is widely considered a pathfinder in advanced computational systems.

"This purchase will allow Ames to continue providing eading-edge computational services to the aerospace community," Dr. F. Ron Bailey, Director of Ames' Aerophysics Office said. "The Y-MP C-90 will be able to perform in excess of 6 billion computations per second, making it one of the fastest computers in the world."

Cray will deliver the Y-MP C-90/16512 supercomputer to Ames next year. Under the contract, the company also will perform maintenance and other support services for the new supercomputer. The Y-MP C-90 will replace Ames' Cray 2 supercomputer acquired in 1985.

- end -

NASA News

National Aeronautics and
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For Release

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September 1, 1992

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(Phone: 415/604-3938)

RELEASE: 92-140

NASA'S PIONEER VENUS ORBITER CLOSES IN ON VENUS

Between now and year's end, the Pioneer Venus Orbiter will skim closer to Venus than ever before, returning significant new knowledge of the planet.

It will explore upper atmosphere regions never before reached, helping answer questions about Venus' environment -- whether there is lightning on the planet and whether Venus once had oceans. The orbiter then will enter Venus' atmosphere at hypersonic speed and burn. This is expected to happen in October, November or December.

"Completing the picture of Venus' outer environment will be a major achievement," said Richard Fimmel of NASA's Ames Research Center, Mountain View, Calif. "It will culminate 14 years of receiving information since the spacecraft was launched in 1978."

Pioneer Venus provided data for the first topographic maps of 90 percent of the planet's previously unknown surface. It identified mountain ranges, plateaus, plains and deep depressions.

The expected findings about Venus' outer environment, Fimmel said, relate to atmosphere/plasma interactions.

Plasmas (electrically charged gases) are the most common form of matter in the universe. The million-mile-an-hour solar wind is an ionized gas which continuously batters Venus' atmosphere . The solar wind and Venus' atmosphere interact in many ways.

- more -

Studying these complex interactions on Venus may increase knowledge of similar interactions in the atmospheres of comets, planets, moons and star systems as well as processes in the early solar system and interstellar gas clouds.

Researchers also hope to find out more about Venus' water-loss mechanisms by measuring for the first time the top of Venus' "mixed" atmosphere and the densest part of the planet's ionosphere.

In the final phase, gravity will bring Pioneer's orbit down into Venus' upper atmosphere. With Pioneer about 84 miles above the planet, NASA Ames officials will raise the low point of its orbit by firing thrusters early on Sept. 7 and then every 5 days thereafter until the estimated four pounds of remaining hydrazine propellant is gone. Then, the spacecraft will plunge into the Venusian atmosphere and burn.

The Pioneer Venus mission has had three phases. NASA researchers held the orbit's lowest point, known as "periapsis," at 93 miles above Venus' surface to map and study the ionosphere and atmosphere during the first 19 months at Venus. In phase two, with only 10 percent of propellant left, they allowed solar gravity to gradually raise periapsis to 1,500 miles and then return it to low altitude.

By June of this year, with periapsis at 125 miles, the orbiter's instruments began to measure Venus' ionosphere again. By Sept. 7, the sun will pull periapsis down to 82 miles. If enough hydrazine remains, thrusters will be fired to raise periapsis eight more times.

By Nov. 22, solar gravity will briefly raise periapsis to about 98 miles, but will pull it down to about 87 miles by Dec. 10. Officials then plan to fire any remaining fuel to obtain more data from farther into Venus' "day side" before the orbiter's final entry into the atmosphere.

- end -

NASA News

National Aeronautics and
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For Release

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September 2, 1992

RELEASE: 92-141

NASA SELECTS SCIENCE/APPLICATIONS ADVISORY COMMITTEE CHAIRMAN

NASA has selected Dr. Claude R. Canizares, head of the Astrophysics Division at the Massachusetts Institute of Technology, as the new Chairman of the Space Science and Applications Advisory Committee.

Dr. Lennard A. Fisk, Associate Administrator of NASA's Office of Space Science and Applications, said that the advisory committee process would be particularly important over the coming months as NASA looks at restructuring parts of its program.

"To preserve a strong set of space science missions in a tight budgetary environment, we need to work especially closely with members of the scientific community," said Fisk.

This committee, a standing committee of the NASA Advisory Council, consults with and advises NASA on its plans, priorities, objectives and strategies to accomplish its multifaceted space science programs.

Concerned with observations from space and use of space technology to support basic research, the committee reviews NASA's plans in the following areas: astrophysics, solar system exploration, solar and space physics, Earth science, microgravity research and life sciences.

Since 1990, he also has served as the Director of the MIT Center for Space Research. He has served on numerous NASA advisory committees, including the Space and Earth Sciences Advisory Committee and the NASA-University Relations Task Force. Also, he served as a member of the National Academy of Science's Astronomy and Astrophysics Survey Committee.

Canizares has written or contributed to more than 114 scientific papers. He earned three degrees from Harvard University -- A.B. in 1967, A.M. in 1968 and Ph.D. in 1972.

- more -

Canizares succeeds Dr. Berrien Moore who led the committee since its formation in 1988. Moore recently received the Distinguished Public Service Medal, one of the highest honors NASA bestows.

Moore had helped to organize the Space Science and Applications Advisory Committee from three former committees -- Space and Earth Sciences, Space Applications and Life Sciences.

Moore merged an extraordinarily diverse group of scientists and perspectives into a coherent and cohesive body, capable of looking at the full spectrum of space science and applications issues and then rendering objective advice.

Currently, Moore is Director of the Institute for the Study of Earth, Oceans and Space at the University of New Hampshire.

- end -

NASA News

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For Release
September 2, 1992

LAUNCH ADVISORY

MARS OBSERVER LAUNCH ABOARD TITAN III RESCHEDULED

NASA today rescheduled the launch of Mars Observer aboard a Titan III rocket from Launch Complex 40 for Friday, Sept. 25. The launch window extends from 12:27 to 2:27 p.m. EDT.

The payload cleaning has been completed and re-encapsulation will begin tonight. The payload will be transported from Kennedy Space Center to Complex 40 on Cape Canaveral Air Force Station late on Thursday night, Sept. 3, and mated to the Titan III rocket early on Friday morning, Sept. 4. A countdown dress rehearsal is scheduled for Sept. 17. Because there is no contingency in this schedule, the launch date will be reviewed after the countdown dress rehearsal.

Additional precautions have been taken at the launch pad and with the spacecraft to assure that recontamination is unlikely to occur.

- end -

NASA News

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For Release

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Headquarters, Washington, DC
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September 2, 1992

Barbara Schwartz
Johnson Space Center, Houston
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RELEASE: 92-142

PAYLOAD COMMANDER NAMED FOR IML-2 MISSION

Richard J. Hieb is named payload commander on the second flight of the International Microgravity Laboratory (IML-2) on Space Shuttle mission STS-66 scheduled for the summer of 1994. The IML series of missions provide opportunities for the international scientific community to conduct life sciences, materials sciences, atmospheric and astronomical studies in the microgravity Spacelab laboratory.

As payload commander, Hieb is responsible for coordinating all payload requirements for the mission.

Hieb is a veteran of two previous Space Shuttle missions. He was the mission specialist on STS-39, an unclassified Department of Defense flight in May 1991, and was responsible for operating the Infrared Background Signature Satellite during release and retrieval using the robot arm and as a free-flying satellite. Hieb was also a mission specialist on STS-49 in May 1992. The crew on this first flight of the new orbiter Endeavour rescued, repaired, and reboosted the stranded Intelsat VI F3 communications satellite.

-end-

NASA News

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Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804/864-6120)

For Release
September 3, 1992

RELEASE: C92-13

NASA PICKS WYLE LABORATORIES FOR SUPPORT SERVICES

NASA has selected Wyle Laboratories, Hampton, Va., for negotiation of a 5-year contract to provide instrument support services at NASA's Langley Research Center, Hampton, Va. Estimated contract value is $75.5 million.

Under the contract, Wyle Laboratories will provide daily instrument support services to satisfy the center's research measurement needs. Services to be performed include repair, calibration and maintenance of research measurement instruments; evaluation of measurement needs, instruments and systems; maintenance of the distributed digital equipment and systems; and design and modification of research data acquisition systems.

The company will do most of the work at its Hampton facility. Some work will be performed on-site at Langley and at NASA's Wallops Flight Facility, Wallops Island, Va. A small part will be done at other remote test sites such as Edwards Air Force Base, Calif.

- end -

NASA News

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For Release
September 4, 1992

EDITORS NOTE: N92-78

NASA STS-47 NEWSROOM HOURS AND PROCEDURES

During Shuttle Mission STS-47, the NASA newsrooms supporting the flight will have extended hours of operation. However, staffing and budget constraints will force some NASA newsrooms to be closed in the evenings and on weekends.

To permit media to ask questions in daily mission press briefings, the following procedures are to be used when a newsroom is closed and it is not possible for the media to ask questions directly of press conference briefers.

Media should write down their name, affiliation and question(s) and facsimile the question(s) to the newsroom at the NASA center originating the briefing at least 1/2 hour prior to the start of the news conference. Facsimile numbers are listed in this announcement. The question(s) will be given to the appropriate briefer who will read the question over NASA select and answer it or refer it to the appropriate expert. Newsroom personnel WILL NOT forward verbal question to the briefing participants.

In an effort to facilitate the flow of communications, listed below are the times each newsroom will be open along with contact phone numbers.

STS-47 NEWSROOM OPERATIONS

Kennedy Space Center, Fla.

Operating Hours	
L-2	7:00 a.m. - 6:00 p.m. EDT
L-1	7:00 a.m. -
Launch day	- 6:00 p.m. EDT
On-Orbit (weekdays)	7:00 a.m. - 6:00 p.m. EDT
On-Orbit (weekends)	Closed
Landing day	Landing - 4 hours. to Landing + 4 hours EDT

- more -

Phone Numbers
Newsroom: 407/867-2468
Facsimile: 407/867-2692
Code-A-Phone: 407/867-2525

After Hours:
Dick Young - 904/423-1800
Karl Kristofferson - 407/267-9302

Johnson Space Center, Houston

Operating Hours
L-2 8:00 a.m. - 5:00 p.m. CDT
L-1 8:00 a.m. - 5:00 p.m. CDT
Launch day 6:00 a.m. - 6:00 p.m. CDT
On-Orbit (weekdays) 6:00 a.m. - 6:00 p.m. CDT
On-Orbit (weekends) 6:00 a.m. - 6:00 p.m. CDT
Landing day 6:00 a.m. - 6:00 p.m. CDT

Phone Numbers
Newsroom: 713/483-5111
Facsimile: 713/483-2000
Code-A-Phone: 713/483-8600

Jack Riley 713/471-0624
Barbara Schwartz 713/474-4769

Marshall Space Flight Center, Huntsville, Ala.

Operating Hours
L-2 8:00 a.m. - 5:00 p.m. CDT
L-1 8:00 a.m. - 5:00 p.m. CDT
Launch day 8:00 a.m. -
On-Orbit (weekdays) Open 24 hours
On-Orbit (weekends) Open 24 hours
Landing day - 5:00 p.m. CDT

Phone Numbers
Newsroom: 205/544-0034
Facsimile: 205/544-2819
Code-A-Phone: 205/544-6397

After Hours: Not necessary. Newsroom open 24 hours

Dryden Flight Research Facility, Edwards, Calif.

Operating Hours	
L-2	7:30 a.m. - 4:00 p.m. PDT
L-1	7:30 a.m. - 4:00 p.m. PDT
Launch day	6:00 a.m. - 4:00 p.m. PDT
On-Orbit (weekdays)	7:30 a.m. - 4:00 p.m. PDT
On-Orbit (weekends)	Closed
Landing day	Landing - 2 hours to Landing + 4 hours PDT

Phone Numbers	
Newsroom:	805/258-3449
Facsimile:	805/258-3566
Code-A-Phone:	805/258-2564

After Hours:
Nancy Lovato - 805/948-2957
Don Haley - 805/943-5817

- end -

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 453-8400

ISY

For Release

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Headquarters, Washington, DC
(Phone: 202/453-8536)

September 2, 1992

Barbara Schwartz
Johnson Space Center, Houston
(Phone: 703/483-5111)

RELEASE: 92-142

PAYLOAD COMMANDER NAMED FOR IML-2 MISSION

Richard J. Hieb is named payload commander on the second flight of the International Microgravity Laboratory (IML-2) on Space Shuttle mission STS-66 scheduled for the summer of 1994. The IML series of missions provide opportunities for the international scientific community to conduct life sciences, materials sciences, atmospheric and astronomical studies in the microgravity Spacelab laboratory.

As payload commander, Hieb is responsible for coordinating all payload requirements for the mission.

Hieb is a veteran of two previous Space Shuttle missions. He was the mission specialist on STS-39, an unclassified Department of Defense flight in May 1991, and was responsible for operating the Infrared Background Signature Satellite during release and retrieval using the robot arm and as a free-flying satellite. Hieb was also a mission specialist on STS-49 in May 1992. The crew on this first flight of the new orbiter Endeavour rescued, repaired, and reboosted the stranded Intelsat VI F3 communications satellite.

- end -

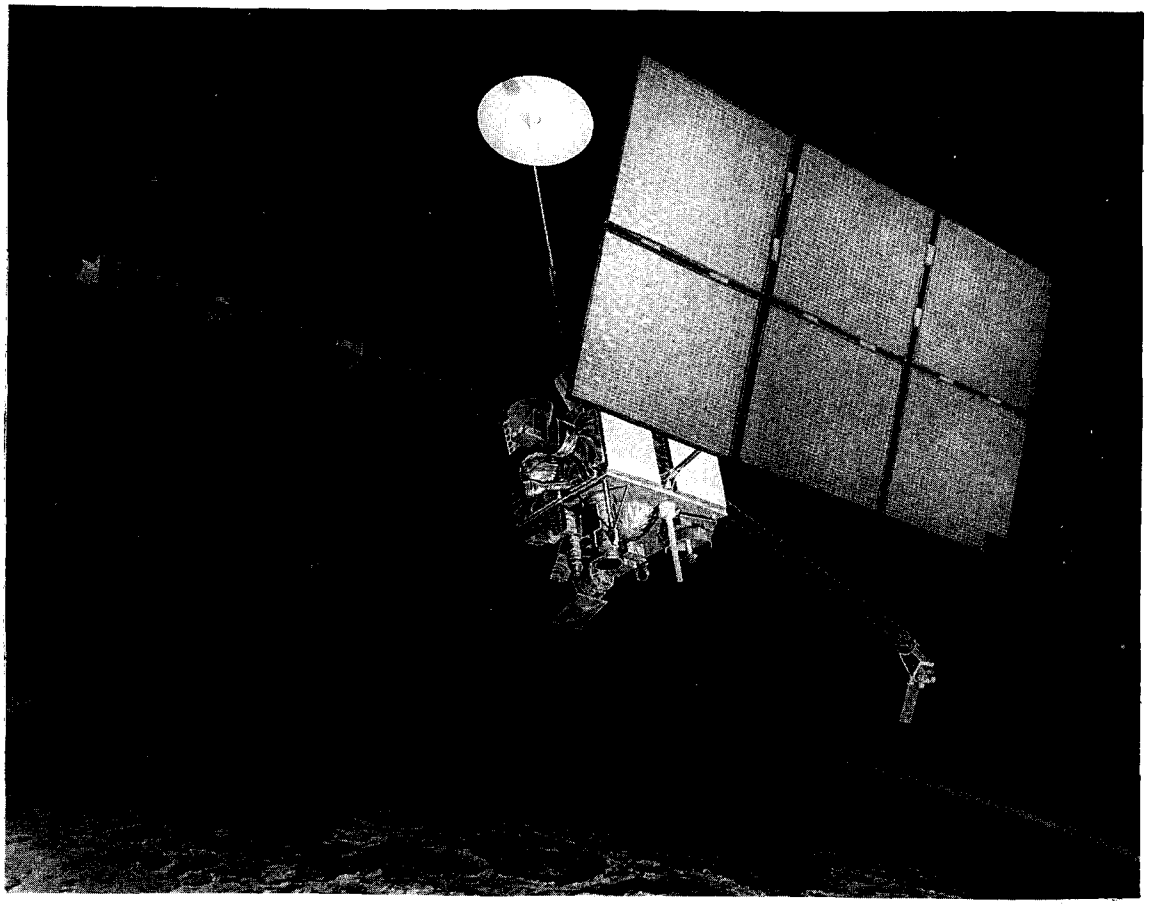
92-142

America's Return to the Red Planet

MARS OBSERVER

PRESS KIT

September 1992



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CONTENTS

RELEASE: 92-142

MARS OBSERVER READY TO TAKE THE NEXT STEP IN MARS EXPLORATION

NASA will continue the exploration of Mars -- started by the Mariner IV spacecraft 28 years ago -- when Mars Observer is launched in September. The last U.S. spacecraft to visit Mars was Viking 2 in 1976.

"Mars Observer will examine Mars much like Earth satellites now map our weather and resources," said Dr. Wesley Huntress, Director of NASA's Solar System Exploration Division, Washington, D.C. "It will give us a vast amount of geological and atmospheric information covering a full Martian year. At last we will know what Mars is actually like in all seasons, from the ground up, pole to pole.

"In the mid 1960s, the Mariner flybys resulted in the historic first pictures of the cratered surface of Mars," Huntress continued. "Then, the Viking landers looked for signs of life at two landing sites. The Viking orbiters also made global maps which gave us a good picture primarily of surface features. Now, the Mars Observer mission marks the next phase in planetary exploration."

"Mars Observer will tell us far more about Mars than we've learned from all previous missions to date," said David Evans, Project Manager, NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif. "We want to put together a global portrait of Mars as it exists today and, with that information, we can begin to understand the history of Mars.

"By studying the evolution of Mars, as well as Venus', we hope to develop a better understanding as to what is now happening to planet Earth," Evans said. "As we look even further into the future, this survey will be used to guide future expeditions to Mars. The first humans to set foot on that planet will certainly use Mars Observer maps and rely on its geologic and climatic data," Evans said.

Launch and Cruise to Mars

Mars Observer is scheduled for launch aboard a Titan III rocket in late September from Cape Canaveral Air Force Station, Fla. The beginning of the launch opportunity is Sept. 16, 1992. The launch window opens at 1:02 p.m. EDT and closes at 3:05 p.m. EDT. The daily launch window will vary slightly on subsequent days. The 28-day launch opportunity extends through Oct. 13, 1992.

Mars Observer will be lofted into Earth orbit aboard a Titan III launch vehicle. After separation from the Titan, an upper stage vehicle -- the Transfer Orbit Stage (TOS) -- will fire to free the spacecraft from Earth's gravity and send it on to Mars.

"During its 11-month transit from Earth to Mars, known as the cruise phase, Mars Observer will deploy four of its six solar panels to begin drawing solar power," said George Pace, Spacecraft Manager at JPL.

"The dish-shaped, high-gain antenna will be deployed and the Magnetometer and Electron Reflectometer (MAG/ER) and the Gamma Ray Spectrometer (GRS) will be partially deployed," Pace said. "Four trajectory correction maneuvers are planned during the cruise phase to guide the spacecraft to its destination."

On Aug. 19, 1993, Mars Observer will arrive in the vicinity of Mars. As it approaches the planet, the spacecraft will fire onboard rocket engines to slow its speed and allow the gravity of Mars to capture it in orbit around the planet.

Mars Observer will first enter a highly elliptical orbit. Then, over a period of 4 months, onboard rocket thrusters will gradually move the spacecraft into a nearly circular orbit inclined 93 degrees to the planet's equator at 204 nautical miles (378 kilometers) above the Martian surface. In this orbit, the spacecraft will fly near the Martian poles.

Global Mapping Mission and Science Operations

Mars Observer will provide scientists with an orbital platform from which the entire Martian surface and atmosphere will be examined and mapped. The measurements will be collected daily from the low-altitude polar orbit, over the course of 1 complete Martian year -- the equivalent of 687 Earth days.

"The scientific payload consists of seven science instruments to examine Mars from the ionosphere -- an envelope of charged particles that surrounds Mars -- through the atmosphere and to the surface," said Dr. Arden Albee, Project Scientist at the California Institute of Technology.

"The science instruments will provide teams of experimenters with daily global maps of the planet," Albee said. "Mars Observer's camera (MC) will resolve objects far smaller than was previously possible -- down to about 33 feet (10 meters) in diameter."

Scientists will control their spaceborne experiments from their home institutions through a computer network linking them to the Mars Observer operations center at JPL. They can access data from their experiments daily using special workstations and electronic communications links and distribute results to other mission science teams.

International Participation

Near the end of its prime mission in the fall of 1995, Mars Observer may be joined by the Russian "Mars '94" spacecraft. Current plans call for the Russian spacecraft to deploy penetrators as well as small surface stations. Mars Observer's Mars Balloon Relay (MBR) radio-receiver equipment, supplied by the Centre National d'Etudes Spatiales (CNES) in France, is designed to relay data from the penetrators and surface stations to Earth.

The Mars Observer mission also includes scientists from three countries besides the United States on its seven investigation teams, both as team members

and as co-investigators. In addition, four foreign participating scientists will join the teams in October 1992.

Also in October, 11 participating scientists from Russia will be added to the teams as part of the continuing formal U.S. - Russian cooperation in planetary exploration.

Program and Mission Management

The Mars Observer spacecraft was built under contract to NASA and JPL by the Astro-Space Division of General Electric, Princeton, N.J.

NASA's Lewis Research Center in Cleveland, Ohio, managed the commercial launch services contract with Martin Marietta Commercial Titan, Inc., Denver, which supplied the Titan III launch vehicle.

The Transfer Orbit Stage (TOS) was built by Martin Marietta under contract to Orbital Sciences Corp., Vienna, Va. The TOS project was managed by NASA's Marshall Space Flight Center, Huntsville, Ala.

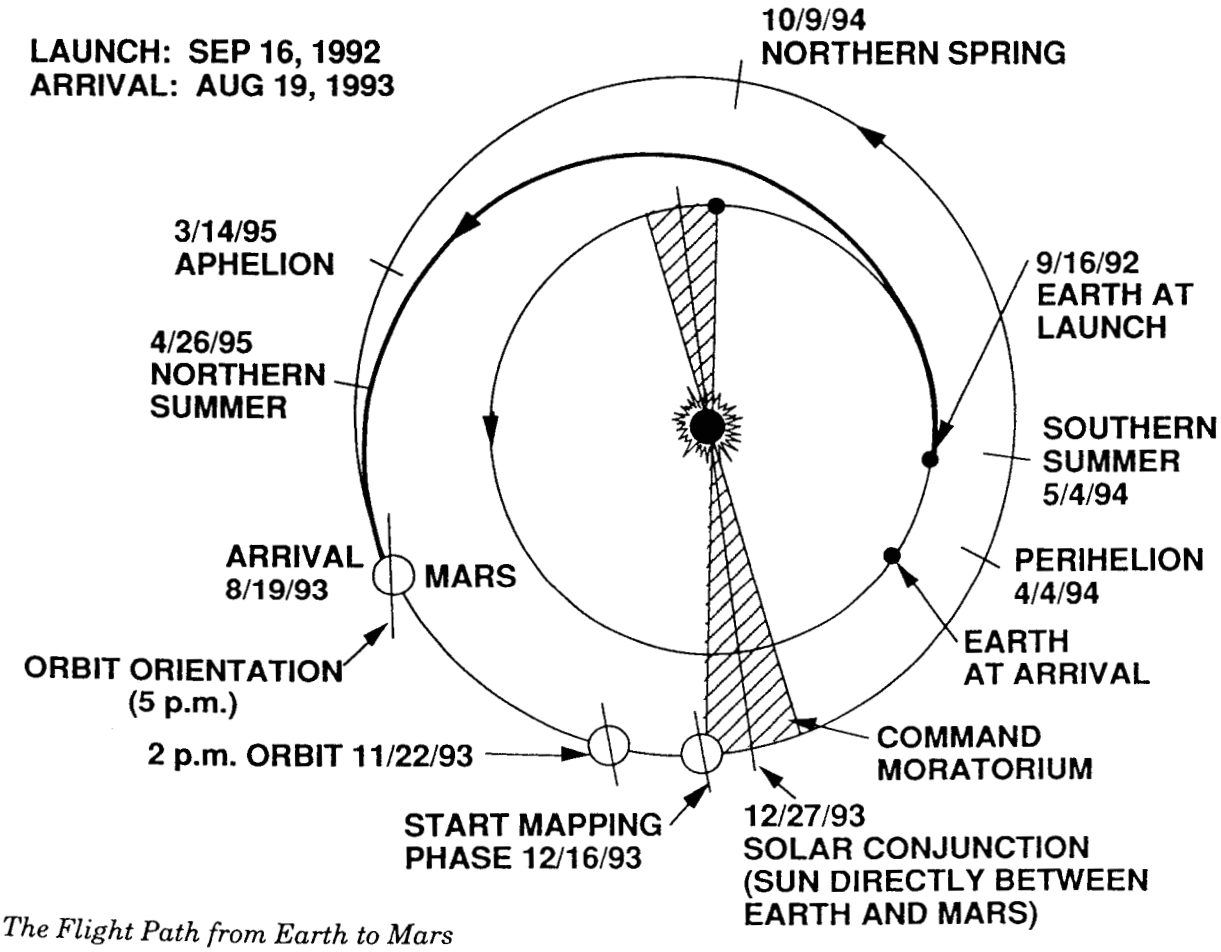
Launch Complex 40 at the Cape Canaveral Air Force Station was completely refurbished for the launch by Martin Marietta and the Bechtel Corporation under contract to the U.S. Air Force.

NASA's Deep Space Network (DSN) will support the launch, mission operations and tracking of the spacecraft throughout its primary mission. Tracking and data retrieval through the DSN are managed by JPL for NASA's Office of Space Communications, Washington, D.C.

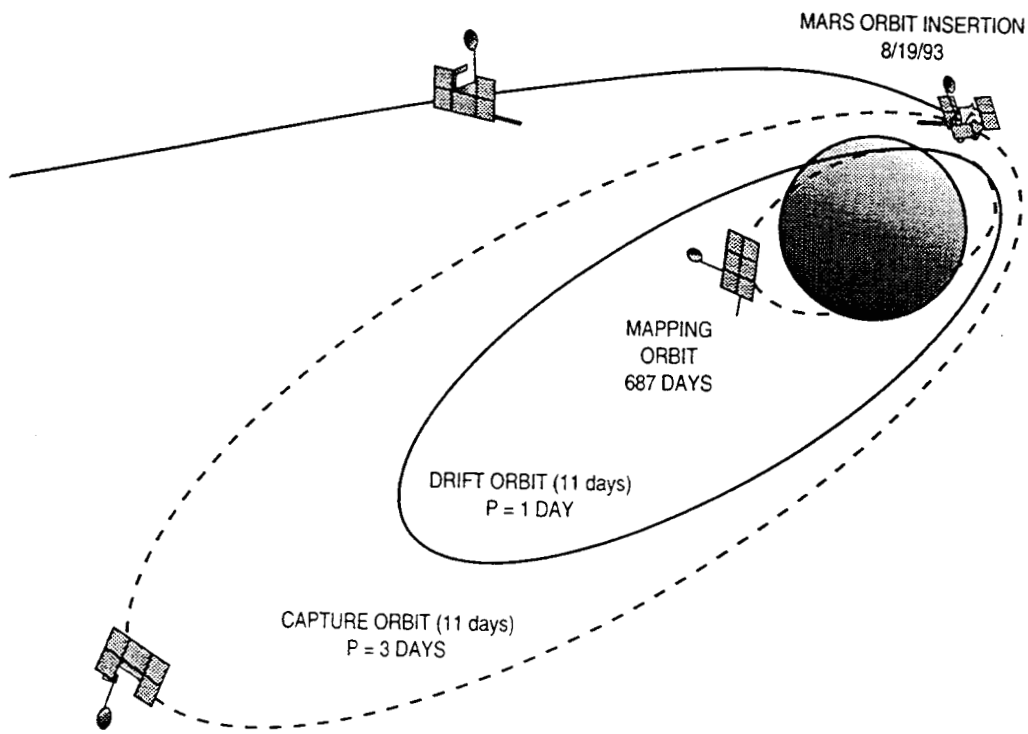
The Mars Observer Project Manager is David D. Evans of JPL. Dr. Arden Albee of the California Institute of Technology is the Project Scientist. Dr. William L. Piotrowski of NASA Headquarters is the Mars Observer Program Manager and Dr. Bevan French is the Program Scientist.

JPL manages the mission for the Solar System Exploration Division of NASA's Office of Space Science and Applications at NASA Headquarters, Washington, D.C.

- end of general release -

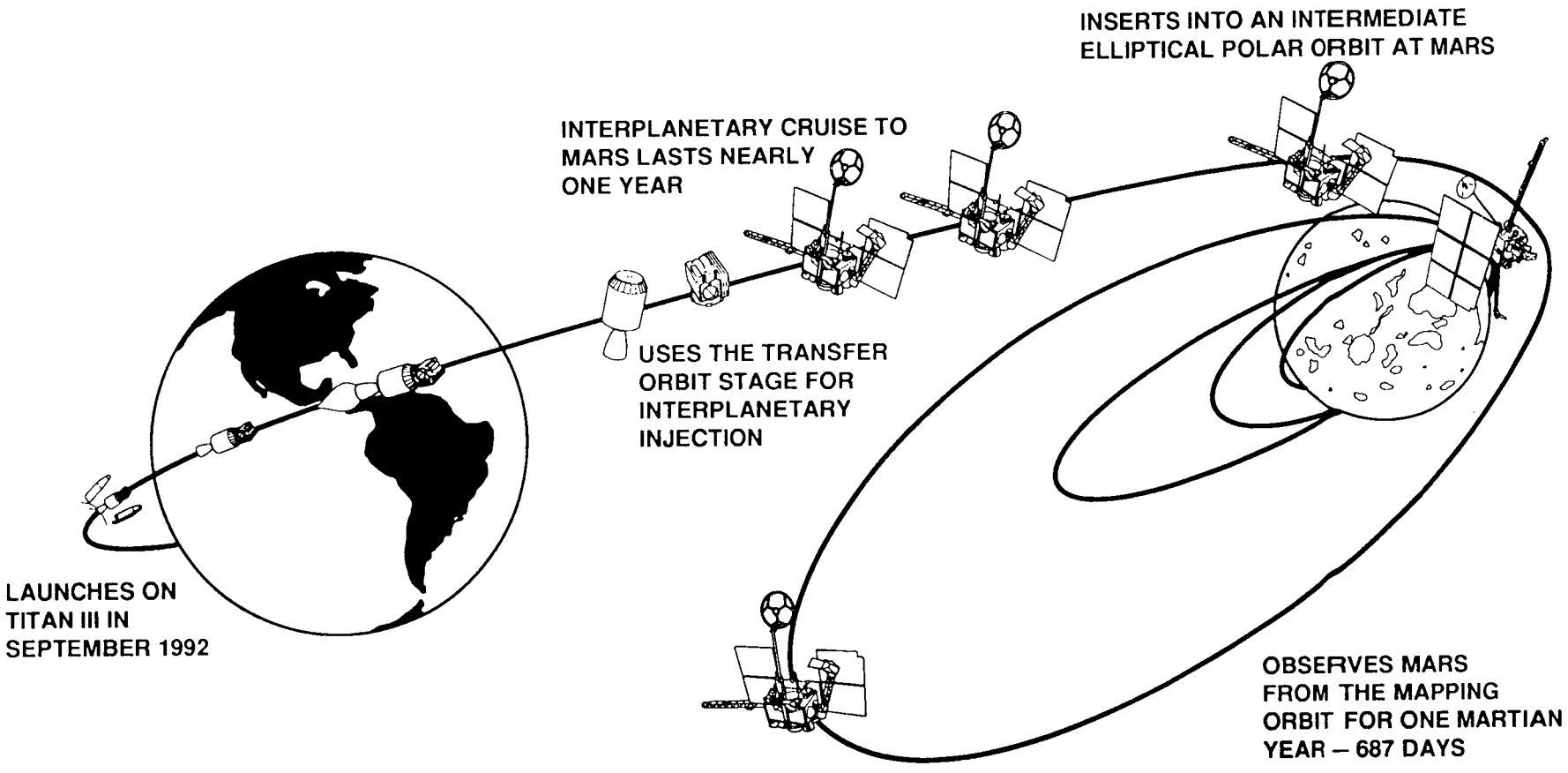


The Flight Path from Earth to Mars



JPL

MARS OBSERVER
MISSION OUTLINE



MARS OBSERVER SCIENCE OBJECTIVES

The Mars Observer mission will study the geology, geophysics and climate of Mars. The primary objectives are to:

- identify and map surface elements and minerals;
- measure the surface topography and features;
- define globally the gravitational field;
- determine the nature of the magnetic field;
- determine the distribution, abundance, sources and destinations of volatile material (carbon dioxide, water) and dust over a seasonal cycle; and
- explore the structure and aspects of the circulation of the atmosphere.

The mission will provide scientists with a global portrait of Mars as it exists today using instruments similar to those now used to study the Earth. The seven instruments have been selected so that observations from one provide a complimentary approach to the mission objectives. For example, the composition of surface minerals will be addressed by both the Gamma Ray Spectrometer (chemical composition) and the Thermal Emission Spectrometer (mineral composition).

The interdisciplinary investigations of the Mars Observer mission also will combine data from more than one instrument to explore questions that cross boundaries between scientific disciplines and individual investigations. The six interdisciplinary investigations are:

- atmospheres/climatology;
- data management/archiving and surface weathering processes;
- geosciences;
- polar atmospheric sciences;
- surface-atmosphere interactions; and
- surface properties and morphology.

The mission will provide a major increase in available scientific data about Mars. During its 687-day mapping mission, Mars Observer will return about 120 megabytes of data per day, for a total of about 80 - 90 gigabytes (about 600 billion bits of information). This amounts to more scientific information than has been returned by all previous planetary missions, whether to Mars or elsewhere, not including the current Magellan mission.

MISSION DESIGN

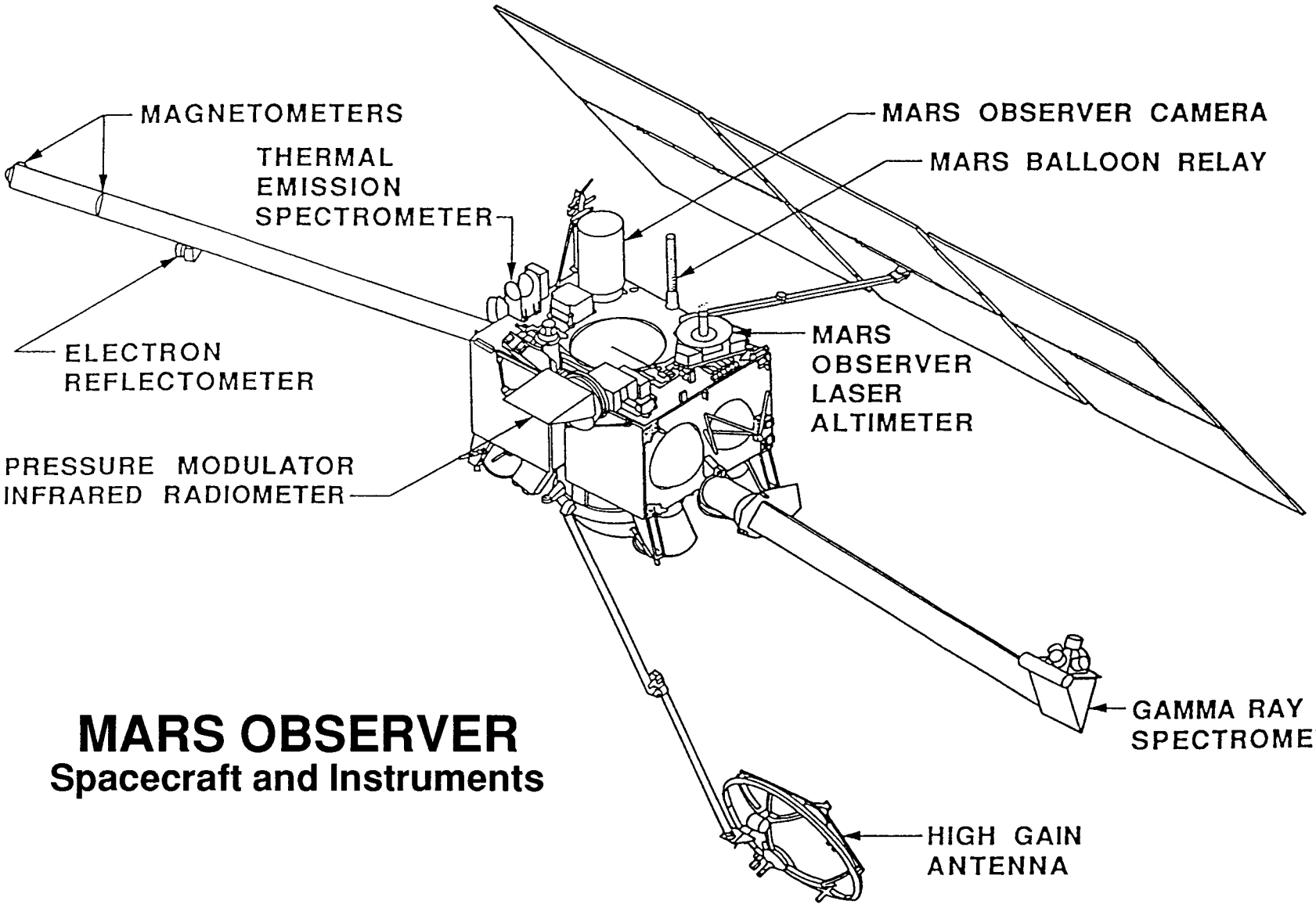
Following launch and insertion into a trans-Martian trajectory by TOS, the spacecraft will perform four trajectory correction maneuvers (TCM) to correct and adjust the trajectory. TCM-1, scheduled for L+15 days (Oct. 1, 1992), will correct any errors from injection. Following TCM-2, both the GRS and the MAG/ER will be activated to collect data on the space environment. On Jan. 20, 1993, the MOC will be powered on to take two narrow angle images as a check-out.

The Mars orbit insertion phase is the transition from the interplanetary cruise phase to the mapping orbit. Since direct transition into the mapping orbit would require undesirable out-of-plane maneuvers, a series of seven orbit insertion maneuvers will be performed to bring the spacecraft into the proper orbit for mapping. During these maneuvers there will be limited scientific activity.

The polar orbit chosen for the Mars Observer mission is low enough to allow close-range study of Mars, but high enough so that the atmosphere does not drag excessively on the spacecraft. The orbit also is sun-synchronous, meaning that the spacecraft will pass over Mars' equator at the same local time during each orbit -- about 2 p.m. on the day side and about 2 a.m. on the night side. This orbit is essential for a number of measurements, as it helps distinguish daily atmospheric variations from seasonal variations.

During the mission's mapping cycle, which begins in earnest on Jan. 13, 1994, data reception from the spacecraft and command updates to the spacecraft and individual science instruments will be conducted on a daily basis.

Once the primary task is completed, the Mars Observer mission may be extended -- if the spacecraft and instruments are still in good condition and if there is enough fuel to control the spacecraft's altitude and orientation.



MARS OBSERVER
Spacecraft and Instruments

SPACECRAFT SCIENCE INSTRUMENTS

Collectively, Mars Observer's seven scientific instruments will cover much of the electromagnetic spectrum and form a complementary array. Each instrument produces sets of data that contribute to a wide variety of scientific investigations.

Gamma Ray Spectrometer (GRS)

The Gamma Ray Spectrometer will characterize the chemical elements present on and near the surface of Mars with a surface resolution of a few hundred kilometers. The data will be obtained by measuring the intensities of gamma rays that emerge from the Martian surface. These high-energy rays are created from the natural decay of radioactive elements or can be produced by the interaction of cosmic rays with the atmosphere and surface.

By observing the number and energy of these gamma rays, it is possible to determine the chemical composition of the surface, element by element. The GRS also can measure the presence of any volatiles, such as water and carbon dioxide, as "permafrost" in the surface materials and the varying thickness of the polar caps.

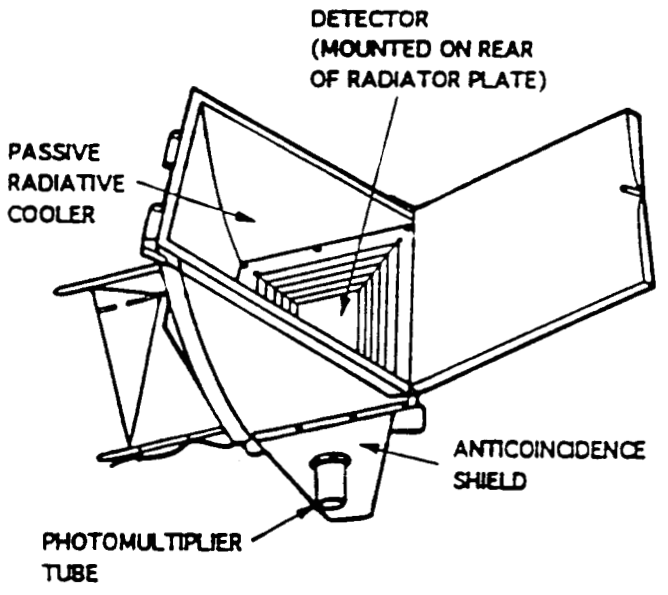
Mars Observer Camera (MOC)

The Mars Observer Camera system will photograph the Martian surface with the highest resolution ever accomplished by an orbiting civilian spacecraft. Resolution is a measure of the smallest object that can be seen in an image.

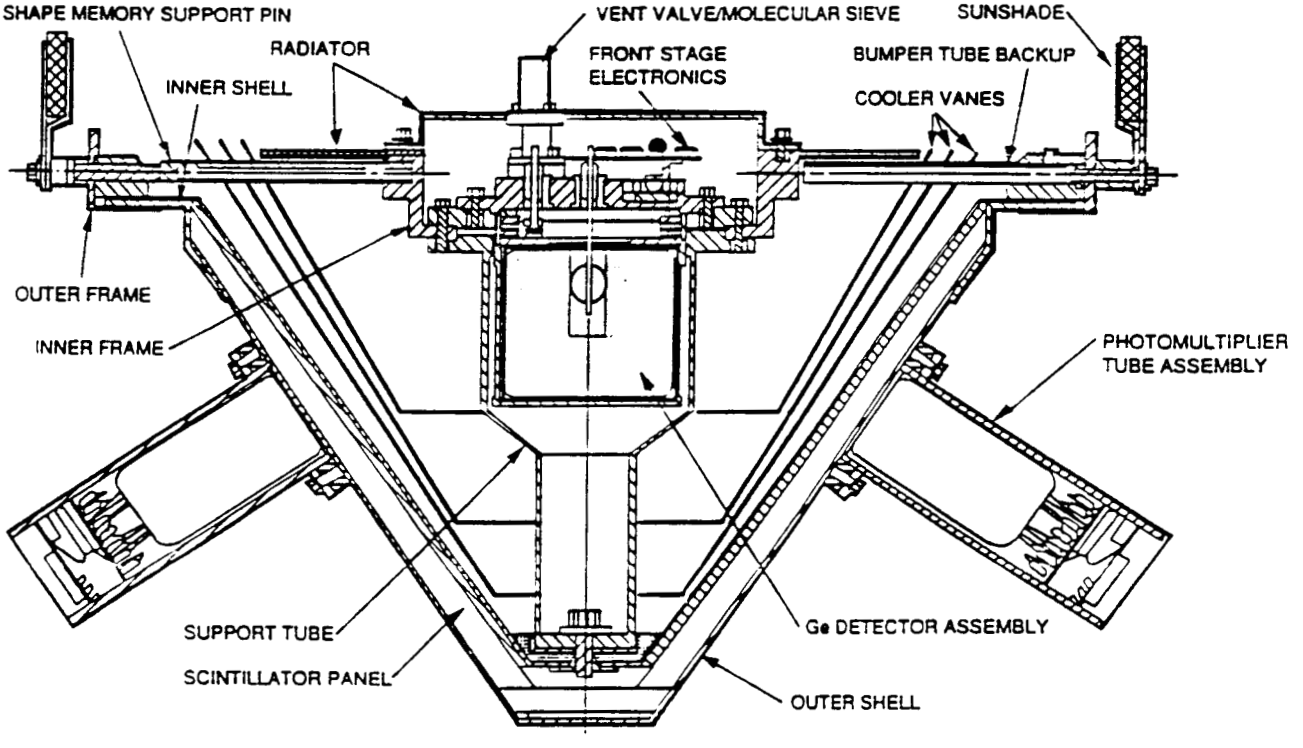
Low-resolution global images of Mars -- a daily 'weather map' -- also will be acquired each day using two wide-angle cameras operated at 4.7-mile (7.5-kilometer) resolution per picture element (pixel). These same cameras will acquire moderate-resolution photographs at 787 feet (240 meters) per pixel.

A separate camera will acquire very-high-resolution images at 4.6 feet (1.4 meters) per pixel for features of special interest. Each of these camera systems uses a line array of several thousand detectors and the motion of the spacecraft to create the images.

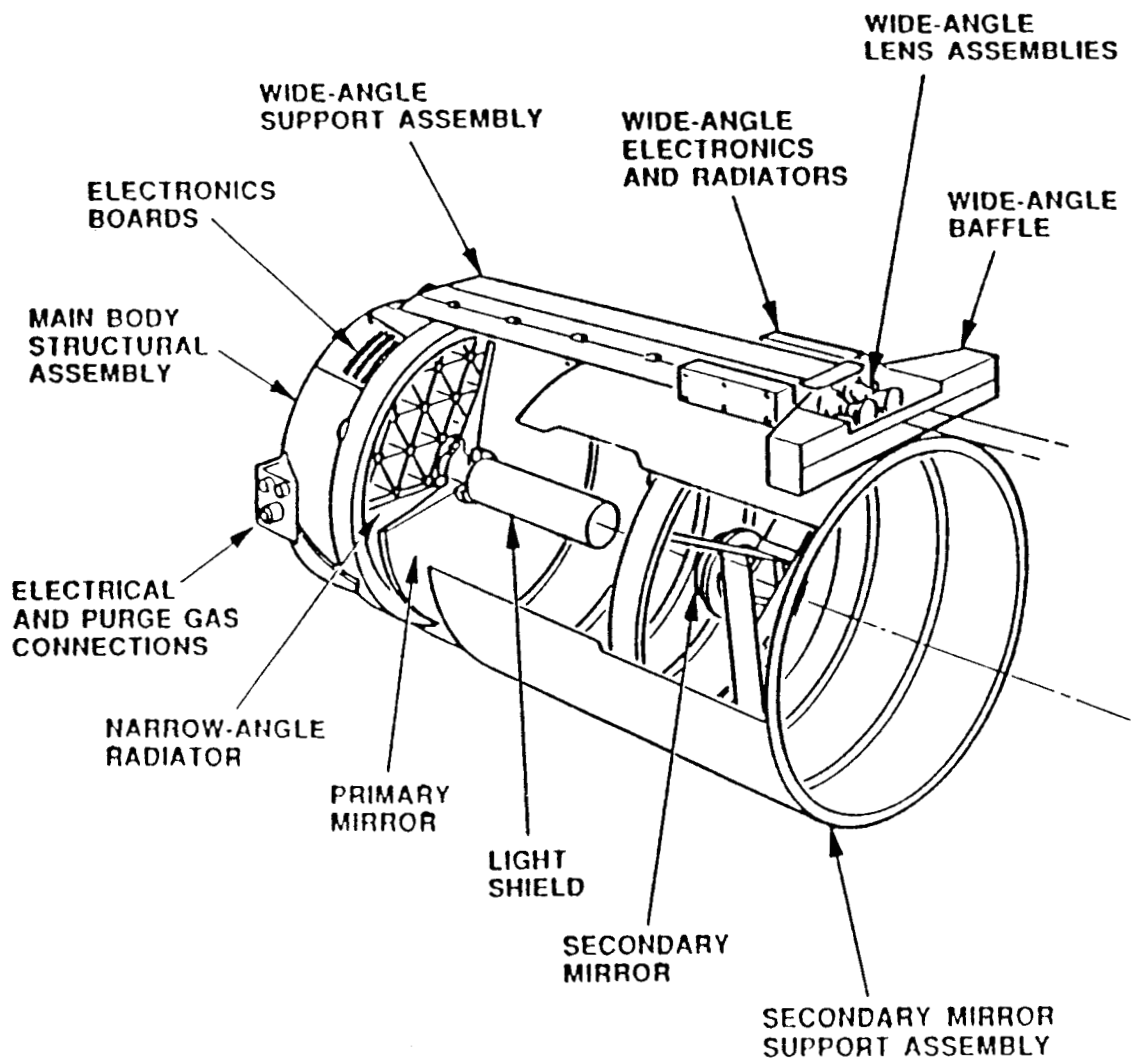
The low-resolution camera system will capture global views of the Martian atmosphere and surface so that scientists may study the Martian weather and related surface changes on a daily basis. Moderate-resolution images will monitor changes in the surface and atmosphere over hours, days, weeks, months and years. The high-resolution camera system will be used selectively because of the high data volume required for each image.



External View of GRS Sensor Head



Cross Section of the GRS Sensor Head



Major components of MOC

Thermal Emission Spectrometer (TES)

The Thermal Emission Spectrometer will measure infrared thermal radiation emitted from the Martian atmosphere and surface. The thermal properties of Martian surface materials and their mineral content may be determined from these measurements. When viewing the surface beneath the spacecraft, the spectrometer has six fields of view, each covering an area of 1.9 by 1.9 miles (3 by 3 kilometers).

The spectrometer, a Michelson interferometer, will determine the composition of surface rocks and ice and map their distribution on the Martian surface. Other capabilities of the instrument will investigate the advance and retreat of the polar ice caps, as well as the amount of radiation absorbed, reflected and emitted by these caps. The distribution of atmospheric dust and clouds also will be examined over the 4 seasons of the Martian year.

Pressure Modulator Infrared Radiometer (PMIRR)

This radiometer will measure the vertical profile of the tenuous Martian atmosphere by detecting infrared radiation from the atmosphere itself. For the most part, the instrument will measure infrared radiation from the limb, or above the horizon, to provide high-resolution (3-mi./5-km.) vertical profiles through the atmosphere.

The measurements will be used to derive atmospheric pressure and determine temperature, water vapor and dust profiles from near the surface to as high as 50 miles above the surface. Using these measurements, global models of the Martian atmosphere, including seasonal changes that affect the polar caps, can be constructed and verified.

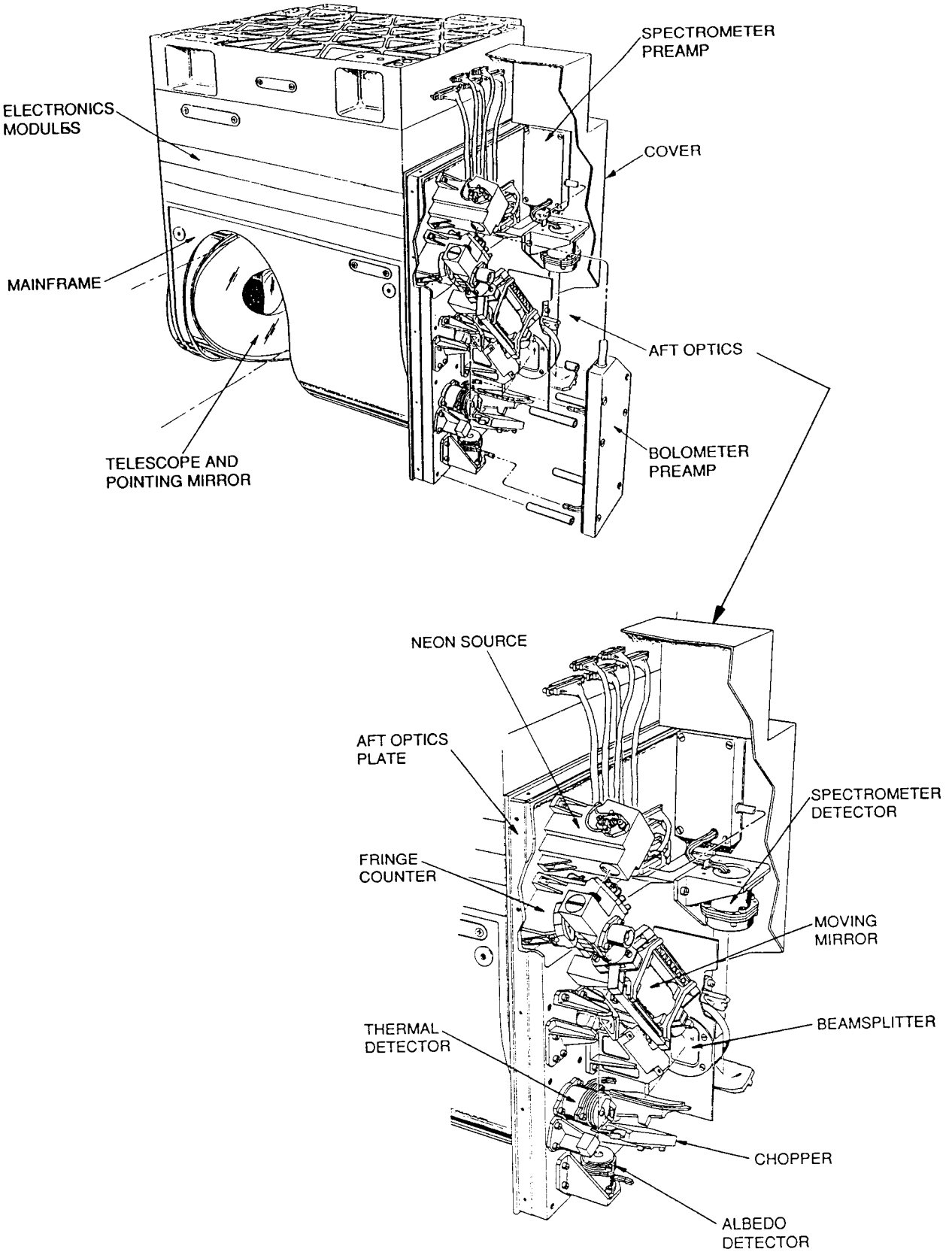
Mars Observer Laser Altimeter (MOLA)

The Mars Observer Laser Altimeter uses a very short pulse of laser light to measure the distance from the spacecraft to the surface with a precision of several meters. These measurements of the topography of Mars will provide a better understanding of the relationship among the Martian gravity field, the surface topography and the forces responsible for shaping the large-scale features of the planet's crust.

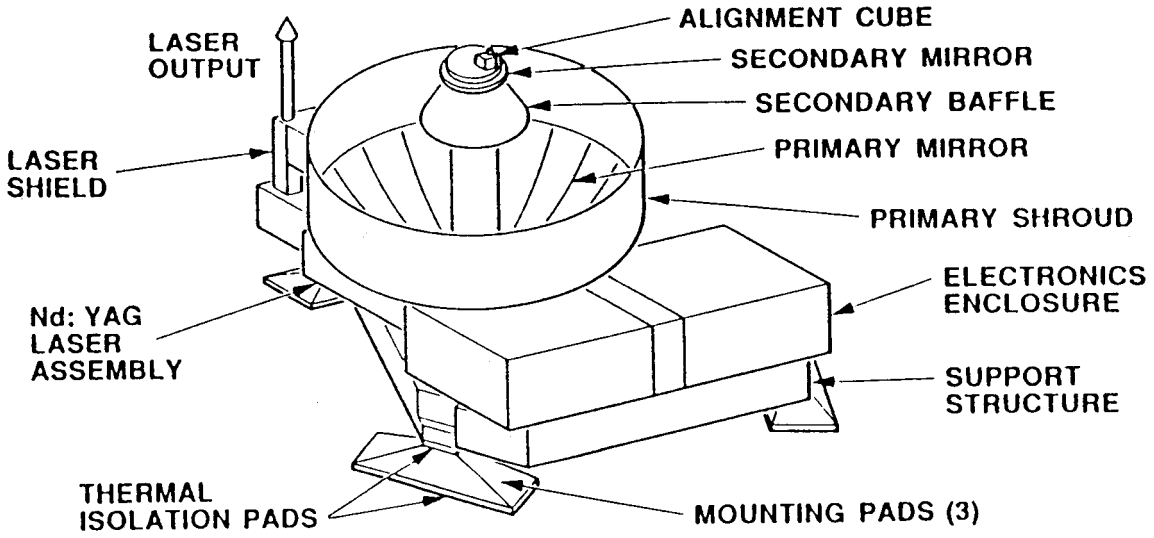
Radio Science

The Radio Science investigation will use the spacecraft's telecommunication system and the giant parabolic (dish-shaped) antennas of NASA's Deep Space Network to probe the Martian gravity field and atmosphere. These measurements will help scientists determine the structure, pressure and temperature of the Martian atmosphere.

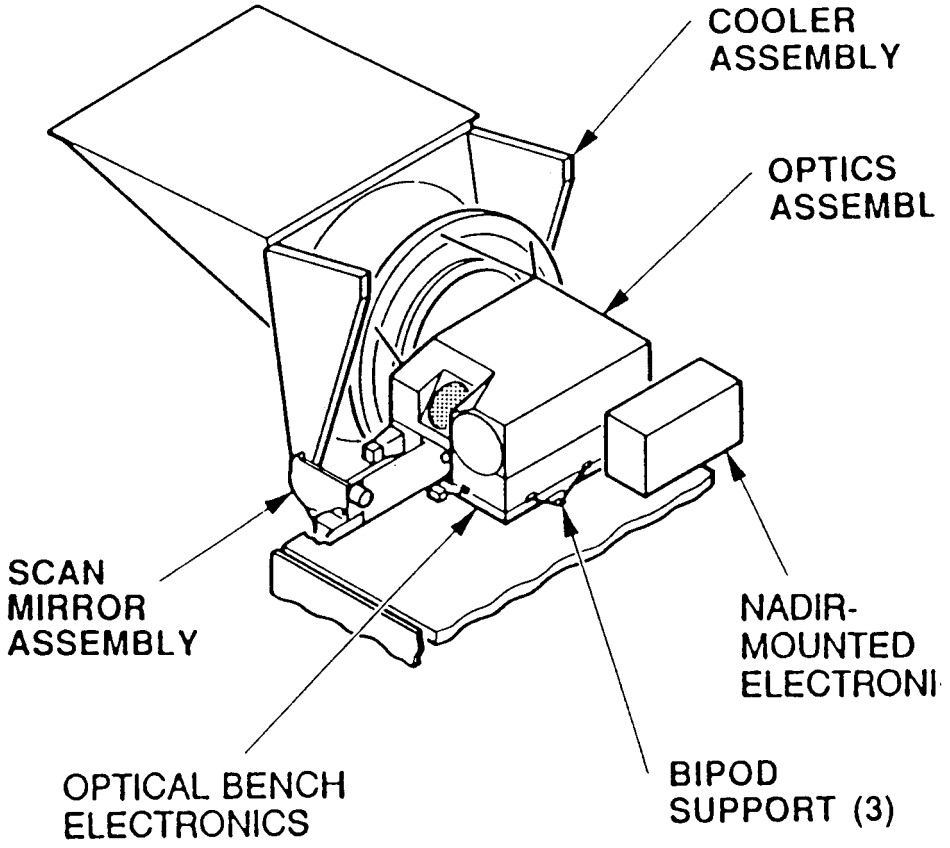
Each time the spacecraft passes behind the planet or reappears on the opposite side, its radio beam will pass through the Martian atmosphere briefly on its way to Earth. The way in which the radio waves are bent and slowed will provide data



Major components of TES



Major components of MOLA



Major components of PMIRR

about the atmospheric structure at a much higher vertical resolution than any other Mars Observer experiment.

During that part of the orbit when the spacecraft is in view of Earth, precise measurements of the frequency of the signal received at the ground tracking stations will be made to determine the velocity change (using the Doppler effect) of the spacecraft in its orbit around Mars. These Doppler measurements, along with measurements of the distance from the Earth to the spacecraft, will be used to navigate the spacecraft and to study the planet's gravitational field.

Gravitational field models of Mars will be used along with topographic measurements to study the Martian crust and upper mantle. By the end of the mission, as a result of the low altitude of the orbit and the uniform coverage of Mars Observer, scientists will have obtained unprecedented global knowledge of the Martian gravitational field.

Magnetometer and Electron Reflectometer (MAG/ER)

Mars is now the only planet in the solar system, aside from Pluto, for which a planetary magnetic field has not yet been detected. In addition to searching for a Martian planetary magnetic field, this instrument also will scan the surface material for remnants of a magnetic field that may have existed in the distant past. The magnetic field generated by the interaction of the solar wind with the upper atmosphere of Mars also will be studied.

Mars Balloon Relay (MBR)

The spacecraft carries a radio system supplied by the French Centre National d'Etudes Spatiales (CNES) to support the Russian Mars 94 mission. The Mars 94 spacecraft consists of an orbiter, to be launched in October 1994, which will deploy penetrators and small stations designed to land and operate on the Martian surface.

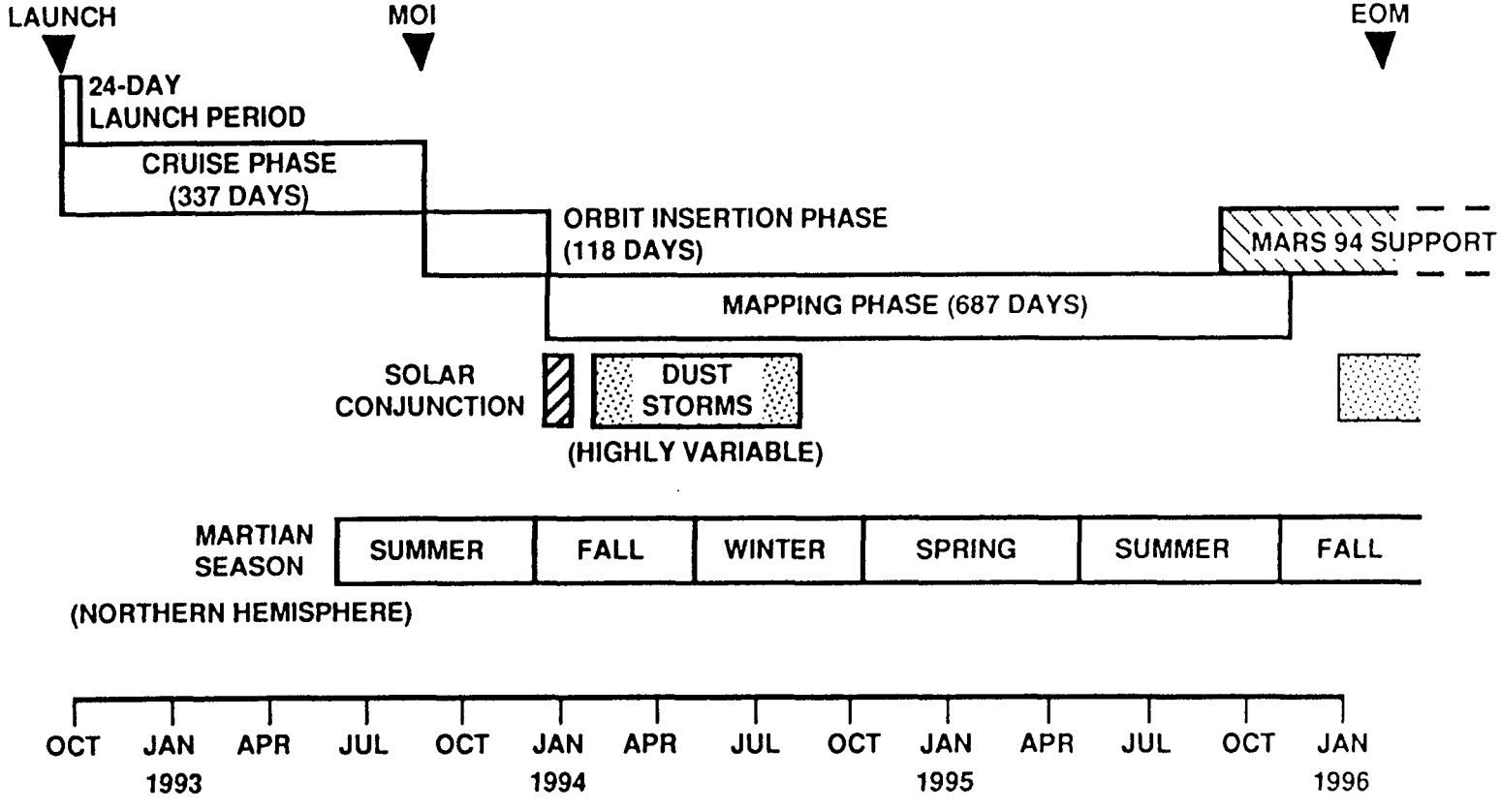
The landers and penetrators will carry instruments to directly sample both the atmosphere and the surface. The landers and penetrators will send data to the Mars 94 orbiter, or to Mars Observer as a back up, for subsequent relay to Earth. Both the landers and penetrators are designed to operate for several years.

The MBR equipment consists of a transmitter/receiver that will periodically receive and relay scientific and engineering data to Earth.

If it is still operating on an extended mission, Mars Observer also may support the Russian Mars '96 mission, which is planning to release a balloon into the Martian atmosphere and possibly deploy landed stations or rover vehicles which can move about on the surface under their own power, operated either by remote control from Earth or autonomously under computer control. Following a launch during the 1996 window, the Mars '96 spacecraft would reach Mars in 1997.

MARS OBSERVER

MISSION TIMELINE



MOI = MARS ORBIT INSERTION

EOM = END OF MISSION

MARS 94 = MARS RADIO RELAY (RUSSIA/FRANCE)

MAPPING CYCLE

In its near-circular mapping orbit, the Mars Observer spacecraft will rotate once per orbit to keep the instruments pointed at the planet. This will allow all instruments to view the planet continuously and uniformly during the entire Martian year.

The spacecraft, instruments and mission were designed so that sufficient resources, especially power and data rate, are available to power all instruments as they collect data simultaneously and continuously on both the day and night sides of the planet. The camera system takes photos only on the day side and will acquire additional images every 3 days during real-time radio transmissions to the Deep Space Network.

The rotation and orientation of the spacecraft are controlled by horizon sensors, a star sensor, gyroscopes and reaction wheels, as is common on Earth-orbiting satellites. The horizon sensors, adapted from a terrestrial design, continuously locate the horizon, providing control signals to the spacecraft. The star sensor will be used for attitude control during the 11-month cruise and as a backup to the horizon sensors during the mapping orbit.

Once during each 118-minute orbit, the spacecraft will enter the shadow of Mars and rely on battery power for about 40 minutes. The battery is charged by the spacecraft's large solar panel, which generates more than a kilowatt of power when it is in the sunlight.

Control of the spacecraft and instruments is accomplished through the use of onboard microprocessors and solid-state memories. Scientific and engineering data are stored on tape recorders for daily playback to Earth. Additional data operations will allow information to be returned in real-time from selected instruments whenever Earth is in view.

The lifetime of the spacecraft will most likely be determined by the supply of attitude-control fuel and the condition of the batteries.

THE SPACECRAFT SYSTEM

The Mars Observer spacecraft uses, where possible, existing Earth-orbiting satellite component designs. The craft's main body is shaped like a box and is about 3.25 feet (1.1 meters) high, 7.0 feet (2.2 meters) wide, and 5.0 feet (1.6 meters) deep. Mars Observer was built by General Electric's Astro-Space Division in Princeton, N.J.

With its fuel, the spacecraft and its science instruments weigh about 5,672 pounds (2,573 kilograms). The spacecraft has a 3-year design lifetime and is equipped with one large solar array, consisting of six 6 x 7.2 x 0.3-foot (183 x 219 x 9.1-centimeter) solar panels.

At launch, the spacecraft's main communication antenna, instrument booms and solar array will be folded close to the spacecraft. During the cruise phase these structures will be partially extended. The two 20-foot (6-meter) instrument booms carry two of Mars Observer's seven scientific instruments, the Magnetometer and Electron Reflectometer and the Gamma Ray Spectrometer.

After the Mars Observer spacecraft reaches its mapping orbit at Mars, the solar array and instrument booms will be fully unfolded. The main communication antenna -- a 4.75- foot (1.45-meter) diameter parabolic antenna -- will be raised on a 20-foot (6-meter) boom and rotated to have a clear view of Earth. The spacecraft then will power its instruments to begin conducting the mission experiments.

SPACECRAFT DESCRIPTION

GENERAL

Design Life	3 years
Mapping Orbit	Mars polar, nearly circular
Altitude Above Mars	204 nautical miles (378 km), nominal
Key Features	Seven science instruments (two mounted on 6-m booms)
	Bi- and monopropulsion systems
	Three-axis control system (highly stabilized)
	Semiautonomous operation (stores up to 2000 commands)
Reliability	Redundancy used to avoid single-point failures
Payload Weight	343 lb (156 kg)
Total Weight	5672 lb (2573 kg)
Size (launch configuration):	
Length	5.0 ft (1.6 m)
Width	7.0 ft (2.2 m)
Height	3.25 ft (1.1 m)

COMMUNICATIONS

Command Rate	12.5 commands/s (max)
Uplink Data Rate	500 bits/s (max)
Downlink Data Rate	85.3 kbits/s (max)
Antennas	1.45-m-diam. high-gain parabolic articulating (on 6-m boom)
	Three low-gain
Downlink RF Power	44 watts
Tape Recorders	1.38×10^9-bit capacity

PROPULSION

Bipropellant System	Monomethyl hydrazine and nitrogen tetroxide
Monopropellant System	Hydrazine
Thrusters (24 total)	(4) 490 N
	(4) 22 N
	(8) 4.5 N (orbit trim)
	(8) 0.9 N (momentum unloading and steering)
Total Propellant Weight	2961 lb (1346 kg)

ATTITUDE AND ARTICULATION CONTROL

Pointing Accuracy	Control: 10 mrad
	Knowledge: 3 mrad
Pointing Stability	1 mrad (for 0.5 s)
	3 mrad (for 12 s)

ELECTRICAL POWER

Solar Array	6 panels, each 183 x 219 cm
Array Output Power	1130 watts
Batteries	42-amp-hr NiCd (2)
Electronics	Bus voltage regulation

Definitions:

mrad = milliradian (≈ 0.057°)

N = newton (≈ 0.225 lb force)

TITAN III LAUNCH VEHICLE

Launch Services Contract

The NASA Lewis Research Center, Cleveland, is responsible for the management of the Titan III launch services contract with Martin Marietta Corp., Denver, for the launch of the Mars Observer.

Lewis is responsible for the management, technical oversight and integration of the payload with the Titan launch system which includes the analytical, physical, environmental and operational integration activities.

Lewis, along with the Jet Propulsion Laboratory and the Marshall Space Flight Center, is responsible for integrated trajectory design, including development of an integrated sequence of events from lift-off through planetary spacecraft separation from the upper stage.

Launch Vehicle

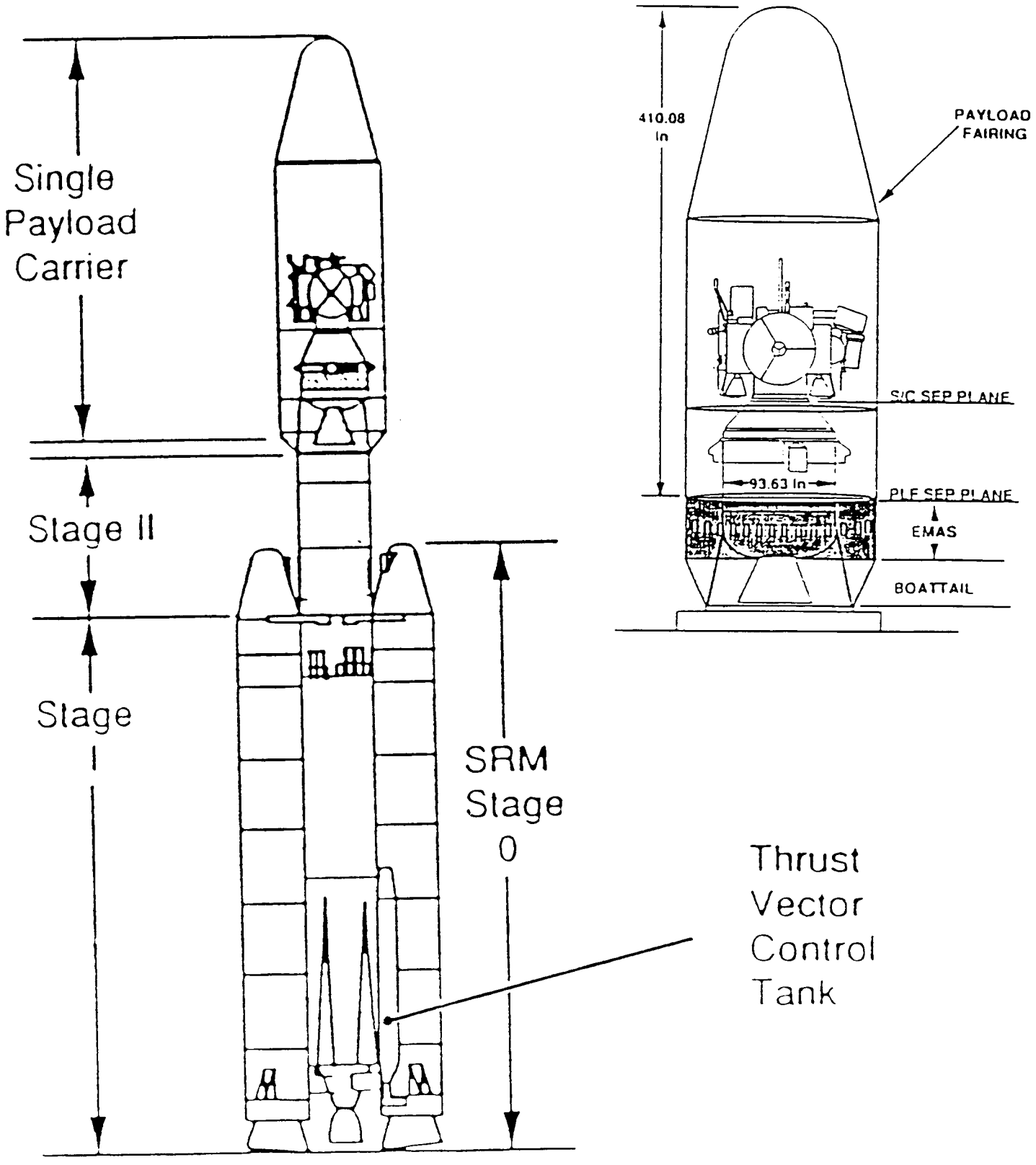
The Titan III can place payloads in excess of 31,000 pounds into low-Earth orbit and up to 11,000 pounds into a geosynchronous transfer orbit. The Titan III is a member of the Titan launch vehicle series that has been in use by the U.S. Air Force and NASA for more than 20 years, including use in the Gemini program. The Titan III also was used for NASA's Voyager missions as well as the two Viking missions, the last U.S. spacecraft to Mars.

The core vehicle consists of two liquid-propellant booster stages that are the central propulsion element. Twin 10.2-foot diameter solid-propellant rocket motors (SRMs) are attached to the core vehicle and provide thrust during initial lift-off and boost phase.

TITAN III FACTS

SOLID ROCKET MOTORS (2)	Length:	90.4 feet (27.6 meters)
	Diameter:	10.2 feet (3.1 meters)
	Motor Thrust	1.4 million pounds (6,200 kiloNewtons) per motor
	Weight:	552,000 pounds (250,387 kilograms) per motor
	Propellants:	UTP-30001B solid
	Contractor:	United Technologies
FIRST STAGE	Length:	78.6 feet (24 meters)
	Diameter:	10 feet (3 meters)
	Engine Thrust:	548,000 pounds (2,437 kiloNewtons)
	Propellants:	Aerozine 50, nitrogen tetroxide
	Contractor:	Martin Marietta
SECOND STAGE	Length:	32.7 feet (10 meters)
	Diameter:	10 feet (3 meters)
	Engine Thrust:	105,000 pounds (467 kiloNewtons)
	Propellants:	Aerozine 50, nitrogen tetroxide
	Contractor:	Martin Marietta
PAYLOAD FAIRING	Diameter:	13.1 feet (4 meters)
	Overall Length:	34.2 feet (10.4 meters)
	Contractor:	Contraves AG
EXTENSION MODULE	Single Payload Mission	
	Length:	4.4 feet (1.34 meters)
	Diameter:	13.1 feet (4 meters)
	Contractor:	Dornier GmbH
LAUNCH SITE	Launch Complex 40 and associated processing facilities at Cape Canaveral Air Force Station, Fla.	
COMMERCIAL TITAN CONTRACTOR TEAM	United Technologies, Chemical Systems Division (solid rocket motors) Aerojet TechSystems Co. (liquid-propellant engines) General Motors' Delco Systems Operations (inertial guidance system) Contraves AG (payload fairing) Dornier GmbH (extension module)	

TITAN III


Single
Payload
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93.63 In
PLF SEP PLANE
EMAS
BOATTAIL

TRANSFER ORBIT STAGE

A new upper stage vehicle, known as the Transfer Orbit Stage (TOS), will make its maiden flight during the Mars Observer mission. Following launch aboard the Titan III rocket, the TOS will propel the spacecraft on its 11-month interplanetary journey to Mars.

TOS is a single-stage, solid-propellant upper stage vehicle used to propel a spacecraft from low-Earth orbit toward its ultimate destination. It is a versatile addition to NASA's inventory of upper stage vehicles, designed to retain reliability and reduce cost.

Under the terms of a 1983 agreement with Orbital Sciences Corp., Fairfax, Va., NASA provided technical assistance during the development of TOS. NASA's TOS Project Office at the Marshall Space Flight Center, Huntsville, Ala., ensured vehicle performance, reliability and compliance with launch vehicle and spacecraft integration and flight-safety requirements.

TOS Vehicle Description

The Mars Observer TOS weighs 24,000 pounds, with a diameter of approximately 11.5 feet and length of just under 11 feet. The TOS system consists of flight vehicle hardware and software, as well as associated ground support equipment. This vehicle uses a United Technologies Chemical Systems Division ORBUS-21 solid rocket motor main propulsion system, a Honeywell, Inc., laser inertial navigation system, a hydrazine reaction control system, and sequencing and power subsystems. It has an inertial guidance and three-axis control system, allowing the spacecraft to roll, pitch and yaw.

The propulsion systems for TOS are a main propulsion system and an attitude control system. The ORBUS-21 solid rocket motor, the main propulsion for TOS, has a gimbaled, or pivoting, nozzle to provide pitch and yaw control during motor firing.

For the Mars Observer mission, TOS will be loaded with approximately 22,000 pounds of the solid propellant HTPB (hydroxyl terminated poly-butadiene). The motor can be loaded with a reduced propellant quantity -- as low as 50 percent of the full load -- to handle a wide range of mission payload and energy requirements.

Motor ignition is provided by a pyrotechnically initiated solid propellant ignitor system. The vehicle's hydrazine-powered reaction control system provides for attitude control of the TOS and TOS/spacecraft combination during solid rocket motor firing and during periods when the large solid rocket motor is not firing. The system uses 12 attitude control system thrusters, or small maneuvering rockets.

TOS avionics hardware and software perform guidance functions, manage the in-flight data, initiate the sequence of events, determine the distance traveled and send back engineering data on rocket systems operation during the boosting phase of the mission.

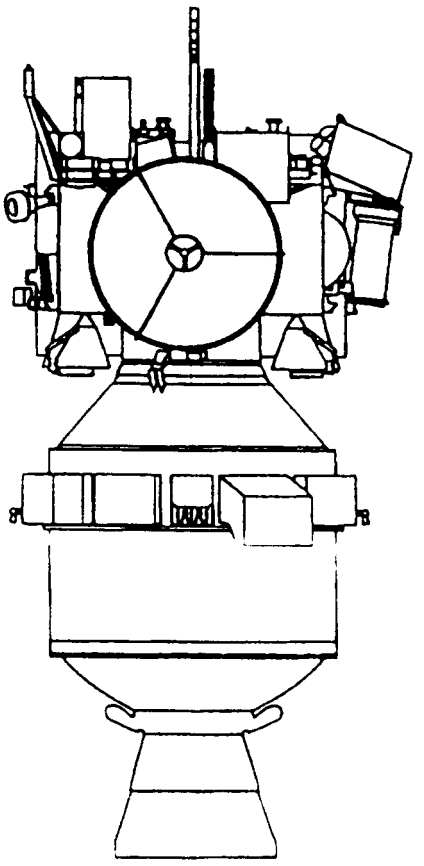
The laser inertial navigation system is the heart of the package which provides the required guidance, navigation and control functions.

The First TOS Mission

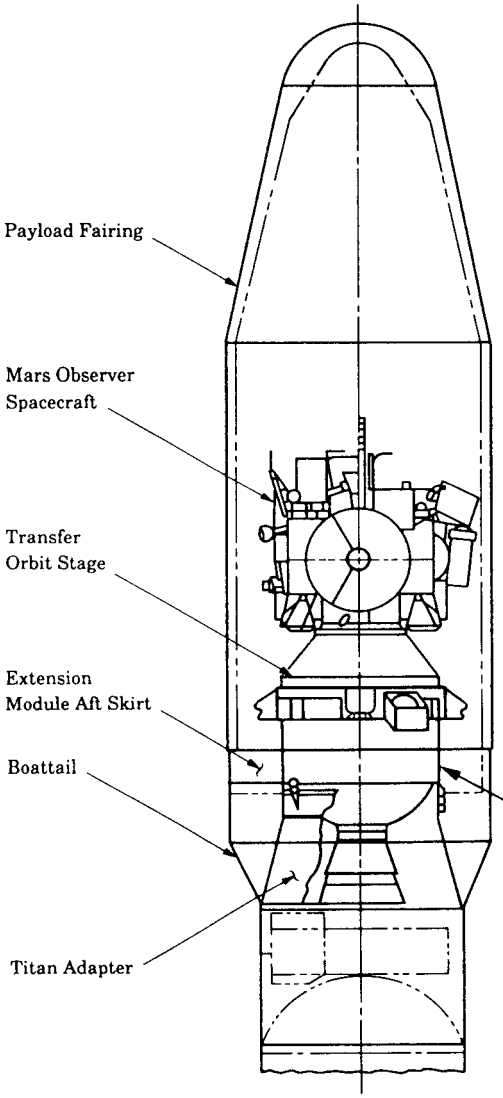
Fifteen minutes after liftoff, the Titan III will separate from the TOS and the Mars Observer spacecraft. For about the next 20 minutes, TOS will provide attitude control of the movements of the spacecraft. It will perform the necessary calculations and generate the proper commands, including rotating the spacecraft for thermal control, to ensure the spacecraft is placed into the proper position for rocket motor ignition which will propel Mars Observer on its interplanetary course.

Approximately 20 minutes after separation from the Titan III, the TOS solid rocket motor will fire for its 150-second burn. The powered-flight period of TOS operation will last approximately 2.5 minutes, during which the spacecraft/TOS combination will reach a speed of 25,575 miles per hour. Then, having done its job, it will separate from the Mars Observer.

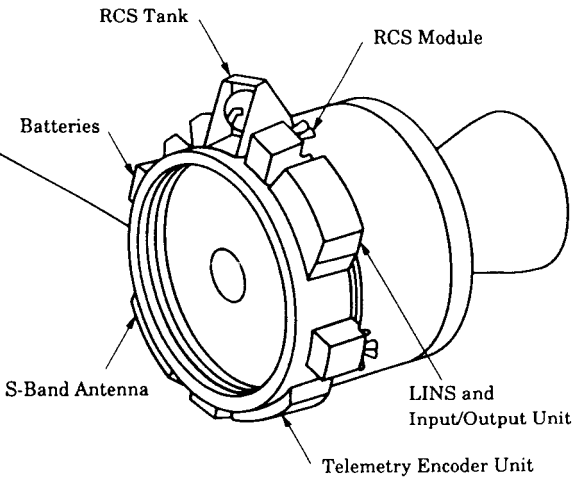
TRANSFER ORBIT STAGE CONFIGURATION



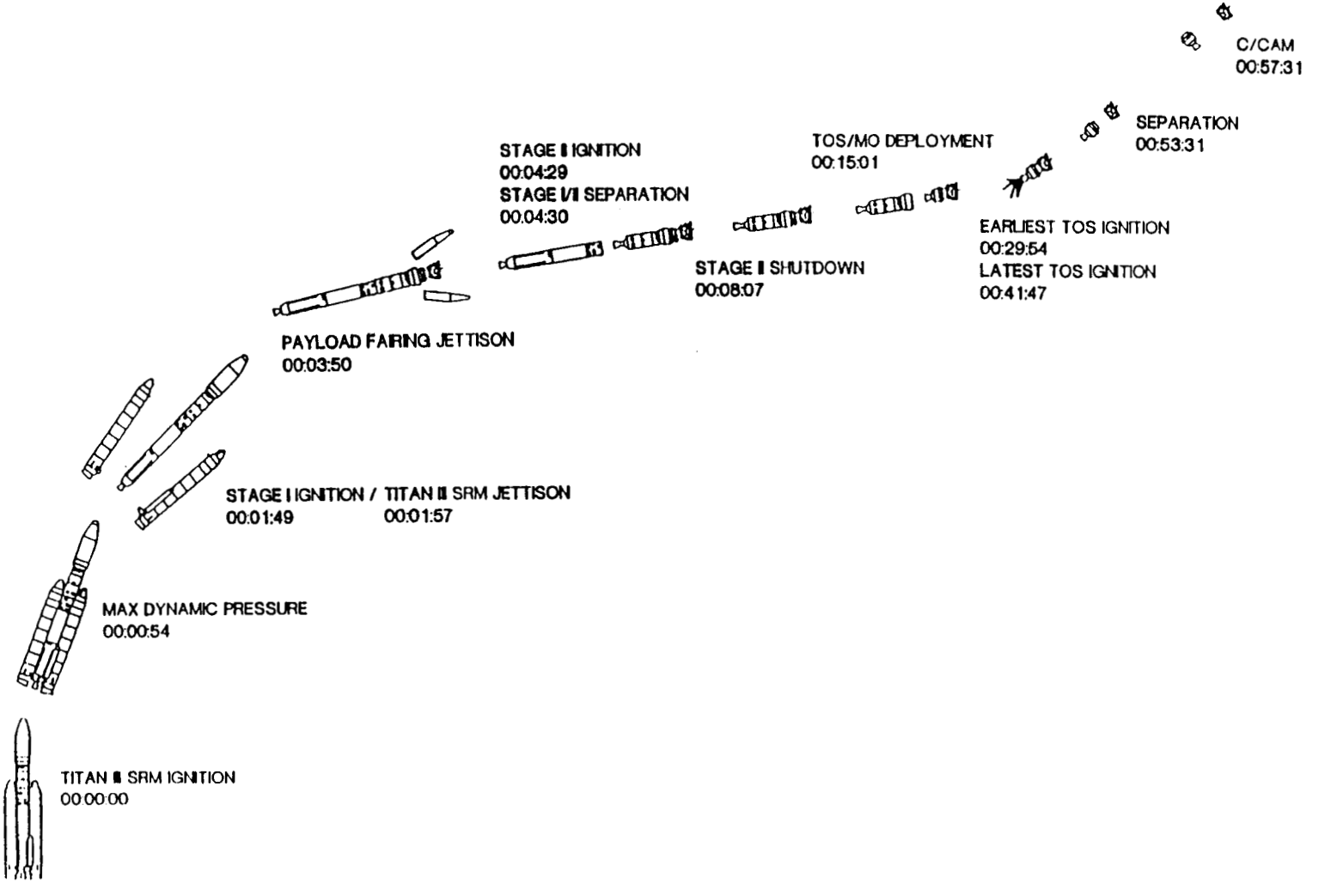
TOS MARS OBSERVER



Titan/TOS and Payload Configuration



Location of TOS Components



Launch Sequence Events

LAUNCH VEHICLE AND PAYLOAD PROCESSING

On June 19, the Mars Observer spacecraft arrived at the Kennedy Space Center (KSC) in an over-the-road environmentally controlled payload transporter known as PETS, the Payload Environmental Transportation System. It was taken to Hangar AO located on Cape Canaveral Air Force Station to begin checkout. Spacecraft subsystem testing was performed, the integrity of the onboard propulsion system was checked and compatibility with the world-wide Deep Space Network tracking stations was verified.

On July 9, Mars Observer was again moved by the PETS from Hangar AO to the Payload Hazardous Servicing Facility (PHSF) on KSC. There, final electrical testing was completed, the spacecraft was fueled with its flight load of hydrazine propellant and a weight and balance measurement was taken.

On Aug. 3, it was mated to the upper stage vehicle, the Transfer Orbit Stage (TOS). The TOS arrived at the PHSF on Jan. 10 to begin processing and electrical testing which was completed in late June.

The Titan III rocket arrived from Martin Marietta in Denver by C-5 aircraft on Feb. 28 and was taken to the Vertical Integration Building (VIB) to begin build up. The first and second stage engine installation activity began in mid-March, and on March 26 the vehicle was erected on the launch platform.

Meanwhile, in the near-by Solid Rocket Motor Assembly Building (SMAB) the build-up of the solid rocket boosters also began in mid-March and was completed on May 18. On June 24, the Titan core vehicle was moved from the VIB to the SMAB for mating to the twin solid rocket booster stack. The rollout of the complete Titan III vehicle to Launch Complex 40 occurred on June 2.

The integrated Mars Observer/Transfer Orbit Stage payload was encapsulated in the Titan III nose fairing at the PHSF on Aug. 19. It was transported to Launch Complex 40 on Cape Canaveral Air Force Station on Aug. 21 and hoisted into the clean room of the gantry-like mobile service tower and mated to the rocket.

On Aug. 25 a routine inspection of the payload revealed particulate contamination on the surface of the spacecraft. The payload was demated and returned to the PHSF for cleaning on Aug. 29. On Sept. 4 the payload was scheduled to be mated to the launch vehicle. A countdown dress rehearsal is scheduled for Sept. 17, with launch scheduled for Sept. 25.

LAUNCH COUNTDOWN AND FLIGHT CONTROL

The countdown for the launch of the Titan III with the Mars Observer spacecraft will be conducted from a combination of NASA and U.S. Air Force Facilities on Cape Canaveral Air Force Station. The primary facility from which management decisions will be made is the Mission Director's Center (MDC) located in Hangar AE. This is the nerve center of expendable vehicle launch operations. From here and the adjacent Launch Vehicle Data Center (LVDC), the health of the launch vehicle and the Mars Observer spacecraft will be monitored before launch.

Actual control of the Titan III rocket before launch, and from where the terminal launch countdown events are initiated, will be from the Vertical Integration Building (VIB) in the Titan complex. Control of the upper stage before launch, the Transfer Orbit Stage, will be from the TOS Payload Operations Control Center (POCC) on Kennedy Space Center.

Also in Hangar AE is where NASA's central telemetry facility, or telemetry lab, is located. During powered flight performance data from the Titan III, the TOS and Mars Observer will arrive here. The data will be recorded and displayed, then forwarded to flight control areas. Among those areas are the MDC and LVDC in Hangar AE, the Mars Observer Mission Operations Center in nearby Hangar AO and the TOS POCC.

All events which occur during powered flight will be monitored and displayed in the Mission Director's Center. Vehicle flight data will also be displayed in the LVDC and the VIB. After payload separation, primary monitoring will be from the Mars Observer Mission Operations Center in Hangar AO, the TOS POCC at KSC and from Jet Propulsion Laboratory in Pasadena.

COUNTDOWN MILESTONE EVENTS:

T-Time (minutes:seconds)	
	Call to stations
T-420	Power-up TOS
T-410	Titan Inertial Guidance System alignment complete
T-400	Range Safety holdfire checks
T-345	Load Mars Observer star catalog
T-255	Begin Titan III final checks
T-230	Titan III checks complete
T-150	Poll launch team for mobile service tower rollback
T-100	Mobile service tower in launch position
T-30	Enter planned 50-minute built-in hold
T-30	Resume countdown
T-25	Mars Observer to flight mode
T-10	Enter 10-minute built in hold/poll launch team
T-10	Resume countdown
T-07	Poll launch team for final status checks
T-05	Resume countdown
T-04	Mars Observer to internal power
T-2:30	Range Safety clear to launch
T-2:00	Start data recorders
T-1:55	Arm firing chain relay
T-1:05	Start launch sequence
T-1:03	Enter terminal count
T-0:50	TOS to inertial guidance
T-0:37	TOS to internal power
T-0:32	Titan III to internal power
T-0:16	Arm Range Safety Command Destruct system
T-0:02	Titan to inertial guidance/arm booster igniters
0.0	Sold rocket booster ignition
0.2	Liftoff
00:54	Maximum dynamic pressure
01:48	Titan core vehicle ignition
01:56	Solid rocket booster jettision
03:51	Jettision payload fairing
04:28	Stage 2 ignition
04:29	Stage 1 separation
08:06	Stage 2 cutoff
15:00	Vehicle/payload separation
31:20	TOS ignition
33:56	TOS burnout
53:31	TOS/Mars Observer separation
68:30	Deploy solar array for cruise
71:40	Deploy high gain antenna
75:26	Deploy Gamma Ray Spectrometer boom for cruise
76:00	Deploy Magnatometer boom for cruise
76:10	Turn on attitude control system
80:42	Turn on low gain transmitter

MARS OBSERVER/TITAN III/TOS TRACKING SUPPORT

Tracking data and telemetry for the Mars Observer/Titan III/TOS launch will be provided by a combination of NASA and U.S. Air Force ground stations down range and around the world.

Spacecraft X-band tracking data and telemetry will be received by the Deep Space Network (DSN) managed by the Jet Propulsion Laboratory, Pasadena, Calif.

Titan III and TOS S-band tracking data and telemetry information and also coverage by C-band radars for ballistic trajectory information will be handled by U.S Air Force tracking stations and the NASA Spacecraft Tracking and Data Network (STDN).

Data coverage also will be supplemented by U.S. Air Force Advanced Range Instrumentation Aircraft (ARIA). Two ARIA will provide support over the Atlantic Ocean and three other ARIA will provide support in the Indian Ocean region.

Following is a partial list of primary tracking station locations and the role they play, either S-band for telemetry and tracking data or C-band for radar coverage and the span of time during the flight when data can be supplied if the launch occurs at the opening of the launch window:

- Merritt Island/Cape Canaveral (NASA S-band/USAF S-band C-Band) 0:00-8:00
- Jupiter Inlet (USAF S-band/C-band) 0:30 - 8:05
- Bermuda (NASA S-band/C-band) 4:12 - 10:48
- Antigua Island (USAF S-band/C-band) 6:10 - 11:48
- ARIA-Atlantic Region (USAF S-band) 13:00 - 17:00
- Canberra, Australia (NASA S-band/X-band) 49:00 - end of support

Communication After Launch

NASA's DSN has the responsibility to communicate with the Mars Observer following injection into its trajectory to Mars. The three Deep Space Communications Complexes, located in Goldstone, Calif., Madrid, Spain and Canberra, will provide the air-to-ground links communication links with the spacecraft in Mars orbit. At its maximum distance from Earth, the time required for a signal to be sent to the spacecraft and be returned to Earth (called the round trip light time) will be approximately 40 minutes.

Communications links which tie together all elements of the project team on Earth are provided by the NASA Communications Network (NASCOM) and the Program Support Communications Network (PSCN).

NASA's Office of Space Communications provides the overall program management for the communication system. The STDN and NASCOM networks are managed by GSFC. The PSCN is managed by the Marshall Space Flight Center, Huntsville, Ala. The DSN is managed by JPL, in concert with Spain and Australia.

SALIENT FACTS ON SPEED AND DISTANCE

Speed in Earth orbit (with respect to Earth)	17,300 mph (7.73 km/s)
Speed at TOS burnout (with respect to Earth)	25,700 mph (11.5 km/s)
Average speed during cruise (with respect to Sun)	56,000 mph (25.0 km/s)
Speed before Mars orbit insertion maneuver (with respect to Mars)	11,800 mph (5.28 km/s)
Speed after Mars orbit insertion maneuver (with respect to Mars)	10,200 mph (4.56 km/s)
Speed in mapping orbit (with respect to Mars)	7,500 mph (3.35 km/s)
Distance traveled between Earth and Mars	450 million miles (7.24 x 10^8 km)
Distance from Earth at Mars arrival	210 million miles (3.4 x 10^8 km)
Distance from Earth during mapping phase	Min: 62 Mmi (10^8 km) Max: 230 Mmi (3.7 x 10^8 km)
Time for command to reach spacecraft during mapping phase	Min: 5.5 minutes Max: 20.5 minutes
Maximum acceleration on spacecraft (postlaunch) (occurs during transfer to low orbit)	0.1 G
Navigation target diameter at Mars (less than 1/10 of planet diameter)	300 miles (480 km)

SCIENCE OPERATIONS

The Mars Observer mission operations at the Jet Propulsion Laboratory will be supported by NASA's Deep Space Network (DSN) and the JPL Advanced Multimission Operations System. The 34-meter (111- foot), high-efficiency subnetwork, the newest of the DSN antenna subnets, will provide daily uplink and downlink communications with the spacecraft at X-band frequencies of 8.4 gigahertz. The 70-meter (230-foot) antenna network also will provide periodic very-long-baseline interferometry and real-time, high-rate telemetry and radio science support to the mission.

The DSN facilities are located in Pasadena and Goldstone, Calif.; Canberea, Australia; and Madrid, Spain.

The instrument scientists will remain at their home institutions, from which they will access Mars Observer data via a project database at JPL. Using workstations and electronic communications links, scientists also will be connected to the mission planning activities at JPL.

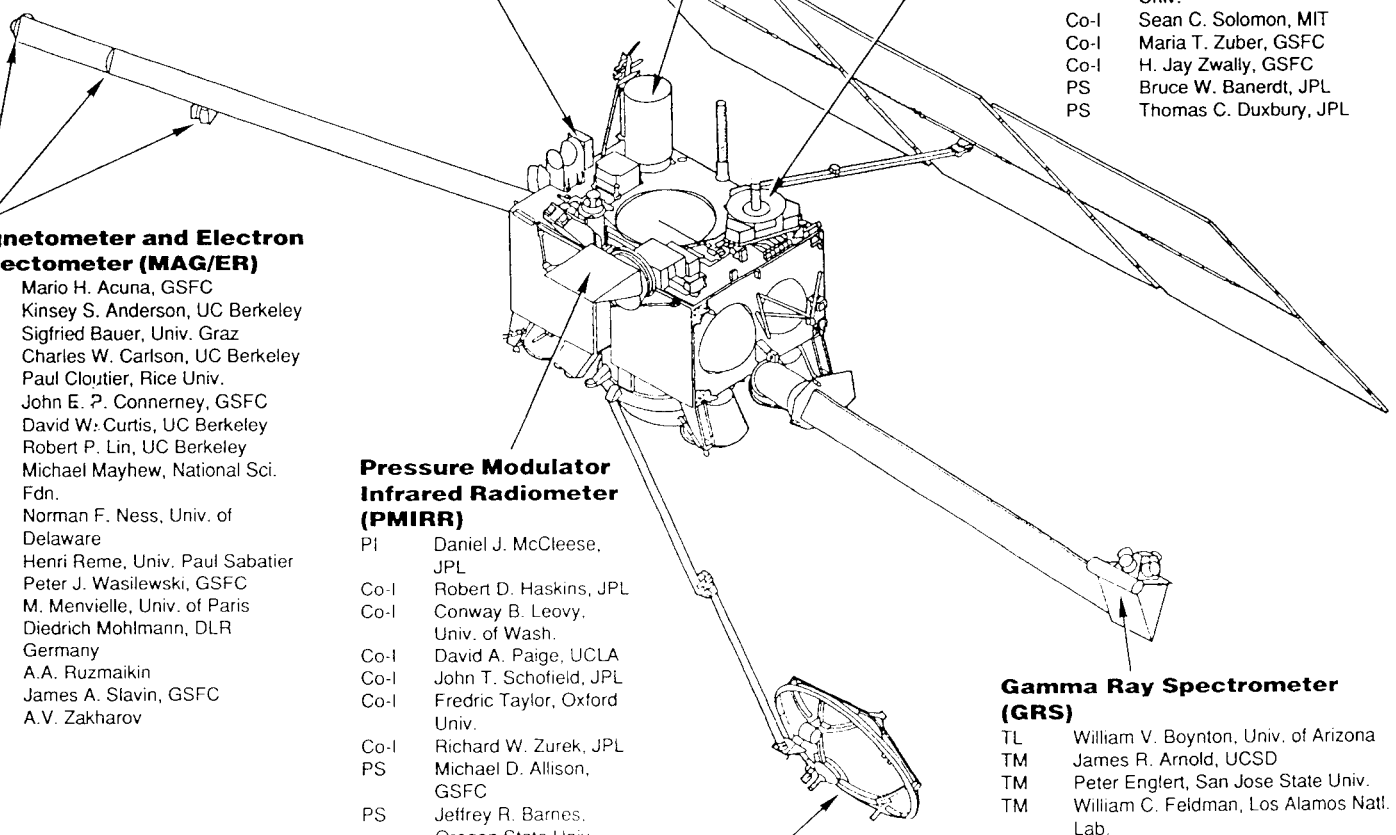
In the same way, data products returned to the JPL database from the home institution for each of the instruments will be sent electronically to other investigators at their home institutions. This will allow scientists to have ready access to science data without moving to JPL for the duration of the mission.

More than 60 workstations will be connected to the project database at JPL, a centralized repository for downlink science and engineering telemetry data, ancillary data including navigation data, and uplink command and sequence data. This database, with about 30 gigabytes of on-line storage, will be electronically available to the science instrument investigators via NASCOM data links.

During the mapping phase, the instrument investigations will return processed science data products to the database at JPL for access by the interdisciplinary scientists and the other investigation teams.

Forty-two participating scientists from universities and scientific institutions in the United States, Russia, France, Germany and Great Britain will join the permanent Mars Observer science team once the mission is under way in October 1992.

Mars Observer Investigators



Mars Observer Camera (MOC)

PI	Michael C. Malin, MSSS
Co-I	G. Edward Danielson, Jr., CIT
Co-I	Andrew P. Ingersoll, CIT
Co-I	Laurence A. Soderblom, USGS
Co-I	Joseph Veverka, Cornell Univ.
PS	Merton E. Davies, RAND
PS	William K. Hartmann, Science Applications Intl.
PS	Philip B. James, Univ. of Toledo
PS	Alfred S. McEwan, USGS
PS	Peter C. Thomas, Cornell Univ.

Thermal Emission Spectrometer (TES)

PI	Philip R. Christensen, ASU
Co-I	Donald A. Anderson, ASU
Co-I	Stillman C. Chase, SBRC
Co-I	Roger N. Clark, USGS
Co-I	Hugh H. Kieffer, USGS
Co-I	Michael C. Malin, MSSS
Co-I	John Pearl, GSFC
PS	Todd R. Clancy, Univ. of Colo.
PS	Barney J. Conrath, GSFC
RPS	R.O. Kuzmin
PS	Ted L. Roush, San Francisco St. Univ.
RPS	A.S. Selivanov

Mars Observer Laser Altimeter (MOLA)

PI	David E. Smith, GSFC
Co-I	Herbert V. Frey, GSFC
Co-I	James B. Garvin, GSFC
Co-I	James W. Head, Brown Univ.
Co-I	James G. Marsh, GSFC
Co-I	Duane Muhleman, CIT
Co-I	Gordon Pettengill, MIT
Co-I	Roger J. Phillips, So. Methodist Univ.
Co-I	Sean C. Solomon, MIT
Co-I	Maria T. Zuber, GSFC
Co-I	H. Jay Zwally, GSFC
PS	Bruce W. Banerdt, JPL
PS	Thomas C. Duxbury, JPL

Magnetometer and Electron Reflectometer (MAG/ER)

PI	Mario H. Acuna, GSFC
Co-I	Kinsey S. Anderson, UC Berkeley
Co-I	Sigfried Bauer, Univ. Graz
Co-I	Charles W. Carlson, UC Berkeley
Co-I	Paul Cloutier, Rice Univ.
Co-I	John E. P. Connerney, GSFC
Co-I	David W. Curtis, UC Berkeley
Co-I	Robert P. Lin, UC Berkeley
Co-I	Michael Mayhew, National Sci. Fdn.
Co-I	Norman F. Ness, Univ. of Delaware
Co-I	Henri Reme, Univ. Paul Sabatier
Co-I	Peter J. Wasilewski, GSFC
FPS	M. Menvielle, Univ. of Paris
FPS	Diedrich Mohlmann, DLR Germany
RPS	A.A. Ruzmaikin
PS	James A. Slavin, GSFC
RPS	A.V. Zakharov

Pressure Modulator Infrared Radiometer (PMIRR)

PI	Daniel J. McCleese, JPL
Co-I	Robert D. Haskins, JPL
Co-I	Conway B. Leovy, Univ. of Wash.
Co-I	David A. Paige, UCLA
Co-I	John T. Schofield, JPL
Co-I	Fredric Taylor, Oxford Univ.
Co-I	Richard W. Zurek, JPL
PS	Michael D. Allison, GSFC
PS	Jeffrey R. Barnes, Oregon State Univ.
PS	Terry Z. Martin, JPL
FPS	Peter L. Read, Oxford Univ.

Radio Science (RS)

TL	G. Leonard Tyler, Stanford Univ.
TM	Georges Balmino, France
TM	David Hinson, Stanford Univ.
TM	William L. Sjogren, JPL
TM	David E. Smith, GSFC
TM	Richard Woo, JPL
RPS	E.L. Akim
PS	John W. Armstrong, JPL
PS	Michael F. Flasar, GSFC
PS	Richard A. Simpson, Stanford Univ.

Gamma Ray Spectrometer (GRS)

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TM	James R. Arnold, UCSD
TM	Peter Englert, San Jose State Univ.
TM	William C. Feldman, Los Alamos Natl. Lab.
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TM	Robert C. Reedy, Los Alamos Natl. Lab.
TM	Steven W. Squyres, Cornell Univ.
TM	Jacob L. Trombka, GSFC
TM	Heinrich Wanke, Max Planck Institut
FPS	Johannes Bruckner, Max Planck Inst.
PS	Darrell M. Drake, Los Alamos Natl. Lab.
PS	Larry G. Evans, Computer Sci. Corp.
PS	John G. Laros, Los Alamos Natl. Lab.
PS	Richard D. Starr, Catholic Univ.
RPS	Yu A. Surkov

LEGEND

ARC	Ames Research Center
Co-I	Co-Investigator
CIT	California Institute of Technology
FPS	Foreign Participating Scientist
GSFC	Goddard Space Flight Center
JPL	Jet Propulsion Laboratory
MIT	Massachusetts Inst. of Technology
MSSS	Malin Space Science Systems
PS	Participating Scientist
RPS	Russian Participating Scientist
TL	Team Leader
TM	Team Member
USGS	U.S. Geological Survey

MARS OBSERVER INVESTIGATORS

Gamma Ray Spectrometer (GRS)
TEAM LEADER: William V. Boynton, University of Arizona
James R. Arnold, University of California, San Diego
Peter Englert, San Jose State University
William C. Feldman, Los Alamos National Laboratory
Albert E. Metzger, Jet Propulsion Laboratory
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Johannes Brückner, Max Planck Institute for Chemistry
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Yu A. Surkov, Russia

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John Pearl, Goddard Space Flight Center
Todd R. Clancy, University of Colorado
Barney J. Conrath, Goddard Space Flight Center
R.O. Kuzmin, Russia
Ted L. Roush, San Francisco State University
A.S. Selivanov, Russia

Pressure Modulator Infrared Radiometer (PMIRR)
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Conway B. Leovy, University of Washington
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Michael D. Allison, Goddard Space Flight Center
Jeffrey R. Barnes, Oregon State University
Terry Z. Martin, Jet Propulsion Laboratory
Peter L. Read, University of Oxford

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James W. Head, Brown University
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Thomas C. Duxbury, Jet Propulsion Laboratory

Radio Science (RS)
TEAM LEADER: G. Leonard Tyler, Stanford University
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David Hinson, Stanford University
William L. Sjogren, Jet Propulsion Laboratory
David E. Smith, Goddard Space Flight Center
Richard Woo, Jet Propulsion Laboratory
E. L. Akim, Russia
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David W. Curtis, University of California, Berkeley
Robert P. Lin, University of California, Berkeley
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A.V. Zakharov, Russia

INTERDISCIPLINARY SCIENTISTS

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Bruce Fegley Jr., Washington University
Michael H. Carr, U.S. Geological Survey
A. T. Bazilevsky, Russia
Matthew Golombek, Jet Propulsion Laboratory
Harry Y. McSween Jr., University of Tennessee
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Howard Houben, Space Physics Research Institute
Bruce M. Jakosky, University of Colorado
L.V. Ksanfomality, Russia
Aaron P. Zent, Search for Extraterrestrial Intelligence (SETI) Institute
James B. Pollack, Ames Research Center
Robert M. Haberle, Ames Research Center
V.I. Moroz, Russia
Laurence A. Soderblom, U.S. Geological Survey
Ken Herkenhoff, Jet Propulsion Laboratory
Bruce C. Murray, California Institute of Technology

Area	Scientist	Objective
Weathering; data management and archiving	R. Arvidson, Washington University, St. Louis, Missouri	Understanding the mechanisms of weathering, their temporal variation, and the cycling of volatiles through the sedimentary system
Geosciences	M. Carr, U.S. Geological Survey, Menlo Park, California	Better understanding of the role of water in surface evolution, characterization of the planet's volcanic history, and determination of the nature and cause of the uplands/plains dichotomy
Polar atmospheric science	A. Ingersoll, California Institute of Technology, Pasadena, California	Definition of atmospheric circulation at all seasons to specify polarward transport of carbon dioxide, water, dust, and energy, as well as the radiative and surface fluxes in the polar regions
Surface-atmospheric science	B. Jakosky, University of Colorado, Boulder	Determine the nature of the interaction between the surface and atmosphere to better understand the processes involved in the formation and evolution of the martian surface and atmosphere
Climatology	J. Pollack, NASA Ames Research Center, Moffett Field, California	Assess the influence of dust on atmospheric circulation, the factors that control the life cycle of dust storms, the role of dynamics in the seasonal water cycle, the transport of dust. the constraints on an early dense carbon dioxide atmosphere, and the modulation of atmospheric circulation due to astronomical variations
Surface processes and geomorphology	L. Soderblom, U.S. Geological Survey, Flagstaff, Arizona	Separate albedo and slope effects for reflection and emission measurements for a wide range of spatial scales and examination of the pattern of change in surficial materials from Mariners 6 and 7 through Mars Observer

MARS OBSERVER MANAGEMENT

NASA HEADQUARTERS, WASHINGTON, D.C.

Office of Space Science and Applications
Dr. Lennard A. Fisk, Associate Administrator
Alphonso V. Diaz, Deputy Associate Administrator
Dr. Wesley T. Huntress, Director, Solar Systems Exploration Div.
Douglas R. Broome, Deputy Director, Solar System Exploration Div.
Dr. William L. Piotrowski, Chief, Flight Programs Branch and Mars Observer Program Manager
William C. Panter, Mars Observer Deputy Program Manager
Dr. Bevin M. French, Mars Observer Program Scientist
Guenter K. Strobel, Planetary Flight Support Manager
Charles R. Gunn, Director, Expendable Launch Vehicles Office
B.C. Lam, Upper Stages Program Manager

Office of Space Communications
Charles T. Force, Associate Administrator for Space Communications
Jerry J. Fitts, Deputy Associate Administrator for Space Communications
Robert M. Hornstein, Director, Ground Networks Div.

JET PROPULSION LABORATORY, PASADENA, CALIF.
Dr. Edward C. Stone, Director
Larry N. Dumas, Deputy Director
John R. Casani, Assistant Laboratory Director, Flight Projects
David D. Evans, Mars Observer Project Manager
Glenn E. Cunningham, Mars Observer Deputy Project Director
Dr. Arden L. Albee, Mars Observer Project Scientist
Frank D. Palluconi, Mars Observer Deputy Project Scientist
Thomas E. Thorpe, Mars Observer Science Manager
George D. Pace, Mars Observer Spacecraft Manager
Gary L. Reisdorf, Mars Observer Payload Manager
Dr. Saterios S. Dallas, Mars Observer Mission Manager
Joseph Shaffer, Mars Observer Launch Vehicle Manager
Gail K. Robinson, Mars Observer Administration and Finance Manager
T. David Linich, Multi-Mission Operations Support Manager
Eugene S. Burke, Multi-Mission Operations Manager
Marvin Traxler, Tracking and Telecommunications Data Systems Manager
Dr. Peter Poon, Coordinator with Multimission Operations Systems Center

KENNEDY SPACE CENTER, FLA.
Robert L. Crippen, Director
James A. "Gene" Thomas, Deputy Director
John T. Conway, Director, Payload Management and Operations
James L. Womack, Director, Expendable Vehicles
George E. Looschen, Chief, Launch Operations Division
David C. Bragdon, Launch Vehicle/Payload Integration Manager

Floyd A. Curington, Chief, Project Planning and Support
James W. Meyer, Tracking and Range Coordinator
JoAnn H. Morgan, Director, Payload Projects Management
Gayle C. Hager, Mars Observer Launch Site Support Manager
Julie A. Scheringer, TOS Launch Site Support Manager

LEWIS RESEARCH CENTER, CLEVELAND
Lawrence J. Ross, Director
Dr. J. Stuart Fordyce, Deputy Director
Thomas H. Cochran, Director, Space Flight Systems
John W. Gibb, Manager, Launch Vehicle Project Office
Steven V. Szabo, Jr., Director, Engineering Directorate
Edward G. Stakolich, Titan Mission Manager
Edwin R. Procasky, Chief, System Engineering Office
Edwin T. Muckley, Chief, Mission and Vehicle Integration Office

MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
Thomas J. Lee, Director
Dr. J. Wayne Littles, Deputy Director
Sidney P. Saucier, Manager, Space Systems Projects
Alvin E. Hughes, Manager, Upper Stage Projects
Robert W. Hughes, Upper Stages Chief Engineer

GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Dr. John Klineberg, Director
Peter T. Burr, Deputy Director
Dr. Dale W. Harris, Director, Flight Projects Directorate
Jeremiah J. Madden, Associate Director of Flight Projects for Earth Observing System (EOS)
Martin J. Donohoe, Project Manager for EOS Instruments Projects
Dr. Douglas D. McLennan, Manager for Mars Observer GRS
Bertrand L. Johnson, Jr., Manager for Mars Observer MOLA

Previous Mars Missions

US Missions

Launch	Mission	Arrival at Mars	Key Results
Nov 5, 1964	Mariner 3	--	Shroud failed to jettison properly, spacecraft did not encounter Mars. Transmissions ceased 9 hours after launch. Entered solar orbit.
Nov 28, 1964	Mariner 4	Jul 14, 1965	Mars flyby. Provided the first close-range images of Mars, confirming the existence of surface craters. Entered solar orbit.
Feb 24, 1969	Mariner 6	Jul 31, 1969	Mars flyby. Provided high-resolution photos of the Martian surface, concentrating on the equatorial region. Entered solar orbit.
Mar 27, 1969	Mariner 7	Aug 5, 1969	Mars flyby. Provided high-resolution photos of the Martian surface, concentrating on the southern hemisphere. Entered solar orbit.
May 8, 1971	Mariner 8	--	Centaur stage malfunctioned shortly after launch.
May 30, 1971	Mariner 9	Nov 13, 1971	Mars orbiter. First interplanetary probe to orbit another planet. During nearly a year of operations, obtained detailed photographs of the Martian moons, Phobos and Deimos, and mapped 100 percent of the Martian surface.
Aug 20, 1975	Viking 1	Jun 19, 1976 (in orbit) Jul 20, 1976 (landed)	Mars orbiter and lander. First US attempt to soft land a spacecraft on another planet. Landed on the Plain of Chryse. Both orbiters took a total of 52,000 images during their mission; approximately 97 percent of the surface was imaged. Viking 1 orbiter continued to operate until Aug 7, 1980; Viking 1 lander operated until Nov 13, 1982.
Sep 9, 1975	Viking 2	Aug 7, 1976 (in orbit) Sep 3, 1976 (landed)	Mars orbiter and lander. Landed on the Plain of Utopia. Discovered water frost on the surface at the end of the Martian winter. The two landers took 4,500 images of the surface and provided over 3 million weather reports. Viking 2 orbiter continued to operate until Jul 25, 1978; Viking 2 lander operated until Nov 13, 1982.

Previous Mars Missions (cont'd)

USSR Missions

Launch	Mission	Arrival at Mars	Key Results
Oct 24, 1962	Sputnik 22	--	Spacecraft and final stage blew up during ascent.
Nov 1, 1962	Mars 1	--	Contact lost when onboard antenna could no longer be turned toward Earth.
Nov 4, 1962	Spuntnik 24	--	Disintegrated during attempt to move from parking orbit into Mars trajectory.
Nov 30, 1964	Zond 2	--	Passed by Mars; failed to return data. Entered into solar orbit.
May 10, 1971	Cosmos 419	--	First use of Proton launcher for a planetary mission. Stranded in Earth orbit when fourth stage failed to separate.
May 19, 1971	Mars 2	Nov 27, 1971	Orbiter and Lander. Landing capsule separated from spacecraft and made first, unsuccessful attempt to soft land. Orbiter continued to transmit data.
May 28, 1971	Mars 3	Dec 2, 1971	Orbiter and Lander. Landing capsule separated from spacecraft and landed in southern hemisphere. Onboard camera transmitted for only 20 seconds. Orbiter transmitted for 3 months.
Jul 21, 1973 Jul 25, 1973	Mars 4 & Mars 5	Feb 10, 1974 Feb 12, 1974	Orbiters and Landers. Mars 4 retro rockets failed to fire, preventing orbit insertion. As it passed the planet, Mars 4 returned one swath of pictures and some radio occultation data. Mars 5 was successfully placed in orbit, but operated only a few days, returning photographs of a small portion of southern hemisphere of Mars.
Aug 5, 1973 Aug 9, 1973	Mars 6 & Mars 7	Mar 12, 1974 Mar 9, 1974	Orbiters and Landers. Mars 6 lander module transmitted data during descent, but transmissions abruptly ceased when the landing rockets were fired. Mars 7 descent module was separated from the main spacecraft due to a problem in the operation of one of the onboard subsystems, and passed by the planet.
Jul 7, 1988 Jul 12, 1988	Phobos 1 & Phobos 2	Jan 1989 (Mars) Jan 1989 (Mars)	International project to study Mars and its moon Phobos. Phobos 1 was disabled by a ground control error. Phobos 2 was successfully inserted into Martian orbit in January 1989 to study the Martian surface, atmosphere and magnetic field. On March 27, 1989, communications with Phobos 2 were lost and efforts to contact the spacecraft were unsuccessful.

NASA News

National Aeronautics and
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ISY

For Release

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September 4, 1992

RELEASE: 92-143

GOLDIN SAYS SPACE AGENCY FORUM NEEDED TO COORDINATE WORLD ACTIVITIES

NASA Administrator Daniel S. Goldin has endorsed the creation of a Space Agency Forum (SAF) to coordinate activities among the leaders of the world's space agencies to prevent duplication and overlap.

"This forum will be a place where space leaders can communicate, and I strongly endorse its formation," Goldin said."

"SAF could serve as a place to promote international cooperation. We need a way to improve the coordination of activities among the leaders of the world's space agencies. In an era of tight budgets, duplication and overlap are a luxury we cannot afford," Golden said in a speech to the World Space Congress.

Hubert Curien, French Minister for Research and Space and Honory Chairman of the Space Agency Forum on International Space Year (SAFISY) proposed the creation of SAF as a follow-on to SAFISY.

This proposal was adopted and a planning group, including the United States, Japan, Europe, Russia, Canada, Brazil and China, has been formed to work out details for the operation of the proposed new organization. The first SAF meeting will be Feb. 25-26, 1993, in Genoa, Italy.

SAFISY Lists Accomplishments

Members of SAFISY, which was created in 1988 to coordinate activities for the International Space Year, listed numerous accomplishments in the fields of Earth science and technology, space education and applications, and space science.

More than 80 delegates from 29 space agencies agreed that SAFISY has been instrumental in furthering international cooperation and acknowledged several major accomplishments including:

- more -

o advancing the current scientific understanding of global environmental change;

o producing new, innovative products for use by the science community;

o enhancing existing cooperation and establishing new partnerships between space organizations, academic and public research organizations;

o emphasizing the role of developing countries in space activities;

o leveraging the knowledge and technical resources of the space agencies to a new area of focus: education and outreach; and

o initiating a new and unique process to facilitate international space cooperation in years to come.

Additional Meeting Results

o agreement to endorse the first international festival of "The Arts and Space," scheduled for Feb. 25-28, 1993, in Cannes, France.

o agreement to endorse the development of an ISY-Yearbook by the U.S. ISY Association.

- end -

Editors note: A fact sheet on SAFISY and a selected listing of SAFISY projects is available by calling the NASA Headquarters newsroom on 202/453-8400.

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For Release
September 4, 1992

RELEASE: 92-144

CALL FOR NEXT GENERATION OF SMALL EXPLORERS ANNOUNCED

An announcement of opportunity inviting proposals for the next set of Small Explorer (SMEX) missions has been sent to the scientific community.

The Small Explorer program provides frequent flight opportunities for highly focussed and relatively inexpensive space science missions. These missions allow critical training opportunities for the next generation of scientists and engineers.

This series of small scientific missions can launch at a rate of about one mission per year, depending on mission cost and the availability of funds. NASA plans to develop only two or three missions which can be completed and launched by 1997.

Proposals for future missions are due Dec. 18, 1992. The opportunity is restricted to the scientific disciplines of astrophysics and space physics, but is open to all categories of organizations, including educational institutions, industry, nonprofit institutions, NASA field centers and other governmental agencies, as well as foreign research institutions.

Total costs for development of missions, including the spacecraft and excluding mission operations and analysis costs following the first 30 days in orbit, are expected to average less than $35 million in FY 1992 dollars.

NASA's first Small Explorer, the Solar Anomalous and Magnetospheric Particle Explorer was launched July 3, 1992. Two other missions are currently approved, the Fast Auroral Snapshot Explorer, scheduled for launch in 1994, and the Submillimeter Wave Astronomy Satellite, set for launch in 1995.

- end -

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For Release

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September 9, 1992

NOTE TO EDITORS: N92-80

GOLDIN STATEMENT ON SENATE SUPPORT FOR SPACE STATION FREEDOM

Following is a statement by NASA Administrator Daniel S. Goldin, following the 63 to 34 vote in the U.S.Senate in support of Space Station Freedom:

"The vote reflects a commitment by members in the Senate to invest in America's future. Funding for NASA is only one percent of the entire federal budget, but it is extremely important because it provides opportunity and hope for the future.

"Space Station Freedom is needed so we can learn how to keep humans healthy in space over long periods of time -- a prerequisite for exploration of our solar system.

"But as NASA reaches for the stars, it produces cutting edge technology that creates new, high-quality jobs on Earth. Space Station Freedom will provide new medical technology to improve healthcare and inspire young Americans to remain and excel in school."

- end -

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September 10, 1992

EDITORS NOTE: N92-81

NASA STRENGTHENS EDUCATION TIES WITH MINORITY GROUPS

NASA Administrator Daniel S. Goldin, Congressman Louis Stokes (D-OH), NAACP Chairman Dr. William Gibson, and NASA Astronaut Col. Charles Bolden will participate in a symposium to expand education and career opportunities for minorities in science, engineering and technology in Orlando, Friday, Sept. 11.

The education symposium coincides with the historic first flight of an African American female astronaut, Dr. Mae C. Jemison. Over 100 representatives of organizations dedicated to expanding education and career opportunities for underrepresented groups in science, engineering and technology plan to attend.

Thursday evening, the conference will feature personal and professional associates of Dr. Jemison who will discuss her training experiences and her mission responsibilities.

Friday, there will be panel discussions with noteworthy educators:

* Dr. Israel Tribble, Florida Endowment Fund
* Dr. Abdulalim Shabazz, Clark-Atlanta University.
* Ms. Salathiel Kendricks, Spelman College
* Dr. Joe Johnson, Forida A&M University
* Mr. Earnest DeLoach, University of Miami
* Dr. William Alter, Texas Space Grant Consortium

Dr. Asa Hillard, Professor Urban Education, Georgia State University is the conference luncheon speaker on Thursday.

Other special guests will include seven students from the NAACP's national African-Academic, Cultural, Technological and Scientific Olympic (ACT-SO) competitions, and ten student NASA award-winners from the International Science and Engineering Fair.

News media wishing to cover the educators conference on Sept. 10-12 should register in the Hibiscus Room, Orlando Marriott, 8001 International Drive.

- end -

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September 11, 1992

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RELEASE: 92-145

JUPITER'S MAGNETIC FIELD SHAPED BY SOLAR WIND

Scientists studying data from Jupiter's highly charged magnetic environment -- acquired by the Ulysses spacecraft encounter in February 1992 -- reported in a series of papers published today that the solar wind exerts a much stronger influence on the planet's magnetic field than previously thought.

The discovery was the result of Ulysses' unique trajectory, which took the spacecraft to higher latitudes near the planet than were reached by previous spacecraft, said JPL Ulysses Project Scientist Dr. Edward J. Smith, principal author of one of seven articles published today in Science magazine.

"In addition, Ulysses' outbound path took the spacecraft through another previously unexplored region in the dusk sector, where we had never been before," Smith said.

Three separate findings during the Jupiter encounter supported this conclusion, Smith said. The first evidence was derived from Ulysses' flight through the high latitude region of the magnetic field -- called the magnetosphere -- in which the planetary magnetic field lines led out into interplanetary space rather than returning to Jupiter across the equator.

"Five of the experiments sensed this transition simultaneously, once at a distance of only 7 planetary radii (500,000 miles) and a second time at a distance of 15 radii (1.1 million miles)," Smith said.

The second major surprise occurred as the spacecraft was traveling outbound. Measurements showed that the magnetic field was not rotating with the planet but was being swept downstream toward the magnetic tail of the magnetosphere, Smith said.

- more -

"This property was seen well inside the magnetosphere at large distances from the boundary with the solar wind," Smith said. "It is, nevertheless, attributed by scientists to a dragging effect of the solar wind on the magnetosphere."

The third piece of the puzzle leading the Ulysses teams to this conclusion was the identification of a thick layer just inside the boundary of the magnetosphere in which solar wind particles and Jovian particles appear to be intermingling, and the magnetic field is not rotating with the planet.

"Scientists interpreted these observations to imply that magnetic field lines are being peeled away from the magnetosphere by the solar wind," Smith said.

Jupiter's magnetic field, the largest in the solar system, forms a windsock -- the magnetosphere -- that is blown by the solar wind. The magnetosphere is known to vary in size and configuration over time depending on the amount of force exerted on it by the solar wind. Millions of highly charged particles swirl and bounce around within this magnetic bubble and many of them eventually escape into interplanetary space.

Smith published his findings along with Dr. Edgar Page, European Space Agency (ESA) science coordinator, and ESA Project Manager Dr. Klaus-Peter Wenzel. Other results of Ulysses' milestone flight past Jupiter were reported in subsequent articles.

"Jupiter is like a cosmic-ray source spewing these things out into interplanetary space all the time," said co-author Page. "The energy probably comes from the planet's rapid rotation every 10 hours." Smith said scientists have made similar observations of the effects of the solar wind on Earth's magnetosphere.

"At Earth, magnetic fields at high latitudes lead out into space, magnetic fields on the flanks of the magnetosphere are pulled tailward and a boundary layer exists adjacent to the solar wind flowing around the magnetosphere," he said.

"For many years, theorists have believed that the solar wind was exerting much less influence on the giant, strongly magnetized Jupiter than on the smaller magnetosphere of Earth," Smith said. "The latest results do not mean that Jupiter is like the Earth in all aspects, but theorists aware of the new Ulysses results are now revising their ideas."

Ulysses is a joint NASA-ESA mission to study the poles of the sun and will begin its primary mission in June 1994.

- end -

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For Release
September 14, 1992

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RELEASE: 92-146

DEIDRE A. LEE APPOINTED NASA DEPUTY PROCUREMENT CHIEF

NASA Administrator Daniel S. Goldin announced today the appointment of Deidre A. Lee, a veteran aerospace acquisitions officer, as Deputy Assistant Administrator for Procurement.

Lee, who managed a variety of procurement activities in both NASA and the Air Force, currently serves as the Executive Officer to NASA's Acting Deputy Administrator Aaron Cohen.

"We are very fortunate to have a person with Deidre Lee's considerable experience and energy to fill this position at a time when we are undertaking major reforms in NASA procurement activities," Goldin said.

Lee joined NASA in 1984 and served in numerous acquisition positions at the Johnson Space Center, Houston. Her final assignment there was Chief of Space Shuttle procurement.

She was assigned to Headquarters, Washington, D.C., in April 1991, as the Special Assistant to the Assistant Administrator for Procurement. In her next assignment as Deputy Director of the Advanced Procurement Planning Division, she managed policy development and allocation and control of procurement office resources.

She also coordinated agency procurement initiatives and represented NASA on numerous internal and external teams studying key procurement issues. Most notable were those affecting resumed human exploration of the solar system.

- more -

Lee became the deputy's Executive Officer last April. In this capacity she played a significant coordination role in the agency's current Red/Blue Team studies to reduce out-year costs of major space and aeronautics projects without undermining mission objectives.

While with the Air Force, Lee was involved in major procurement activities for the systems and logistics commands and for the Pacific Air Forces.

She holds a masters degree in public administration from the University of Oklahoma and was selected by NASA to attend the prestigious Middle Management Program of the Graduate School of Management of Simmons College, Boston.

- end -

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For Release

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September 15, 1992

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RELEASE: 92-147

NASA-DEVELOPED "TELEPRESENCE" KEY TO ANTARCTIC EXPEDITION

NASA scientists will use "telepresence" technology in the Antarctic this fall to see if life that existed millions of years ago on Earth can provide clues about organisms that once may have lived on Mars.

A 5-member research team will travel to Antarctica in October to study sediment on the bottom of ice-covered Lake Hoare on Ross Island. They will examine the physical and biological nature of the lake, including its temperature, chemical composition and the gas content of the water. The key research tool will be a mini-submarine mounting a camera that researchers will control with a video headset.

"Antarctica is the most Mars-like environment on Earth," said Dr. Carol Stoker, a scientist and expedition member from NASA's Ames Research Center, Mountain View, Calif. "We're taking this technology to a hostile environment to conduct research that has direct applications to NASA's goal of exploring Mars."

The team also plans to continue studies of ice-covered lakes started earlier this year during a joint NASA-Russian expedition in the Bunger Hills Oasis of Eastern Antarctica. That study was part of Ames' research into microbes living in extreme environments.

The telepresence technology relies on a video headset that lets researchers use head movements to point the camera on the underwater vehicle. Team members will steer the vehicle by remote control with joysticks or body motion.

- more -

"There are lots of work going on in the Silicon Valley using telepresence in various engineering applications," Stoker said. "But we are the only ones using this technology for field science."

The 2-month expedition is a joint NASA-National Science Foundation project. Team leader is Dr. Robert Wharton, a scientist from the Desert Research Institute at the University of Nevada. Other team members are Dr. Scott Tyler of the Desert Research Institute and Ames researchers Stoker, Dale Andersen and Don Barch.

The Telepresence-Controlled Remotely Operated Vehicle was built by Deep Ocean Engineering Inc., San Leandro, Calif.

- end -

NOTE TO EDITORS: A video clip is available to media by calling 202/453-8594. Still photos to illustrate this release are available by calling 202/453-8373.

Color:	B&W:
92-HC-598	92-H-653

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For Release

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September 15, 1992

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RELEASE: 92-148

NASA SPACECRAFT BEGINS GRAVITY MAPPING OF VENUS

The Magellan spacecraft's orbit at its closest approach to Venus was lowered Monday and today it began a full 243-day cycle of gravity mapping, project officials at NASA's Jet Propulsion Laboratory, Pasadena, Calif., said.

Magellan has now completed three cycles of mapping with its radar, covering 99 percent of the surface of Venus. Monday, controllers ordered a 1-hour orbit adjustment burn to lower its periapsis -- closest approach to the planet -- altitude from 160 miles (258 kilometers) to 113 miles (182 kilometers).

"That will help us obtain the best possible resolution in the equatorial latitude gravity map," Project Manager Doug Griffith said.

The objective of cycle 4, which extends to May 15, 1993, is to obtain a global map of the Venus gravity field from the elliptical orbit. The orbit apoapsis, or furthest point from the planet, remains the same, 5,296 miles (8,543 kilometers).

During this fourth cycle, variations in the gravitational pull experienced by the spacecraft are being recorded by carefully tracking the Doppler shift of a radio signal that Magellan will constantly beam to the Deep Space Network tracking stations.

When Magellan passes over a dense region of Venus' interior, for example, the spacecraft accelerates in its orbit and the location of the denser region is mapped.

Over the course of the 243-day cycle, one rotation of Venus, variations in the planet's density will be mapped at a resolution much higher than achieved by previous missions.

- more -

Looking at the interior with gravity observations is expected to provide an improved understanding of the forces of tectonics and volcanism that shape the planet.

Magellan is managed by the Jet Propulsion Laboratory for NASA's Office of Space Science and Applications, Washington, D.C.

- end -

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For Release
September 15, 1992

RELEASE: 92-149

NASA RESEARCH PLANE TO ASSESS HURRICANE INIKI DAMAGE

Mountain View, Calif. -- A NASA Ames Research ER-2 aircraft will take high altitude aerial images of the Hawaiian Islands to help officials determine the full extent of the damage caused by Hurricane Iniki.

"The State of Hawaii has an urgent need for high quality, high altitude aerial photography...to assist us in our planning and recovery operations in the aftermath of Hurricane Iniki," the Director of Hawaii's Office of State Planning, Harold Masumoto, stated in a letter Monday to Ames' High Altitude Missions Branch Chief John Arvesen.

The ER-2 will take off from Ames at about 6:30 a.m. PDT Wednesday, Sept. 16, flying to Hawaii to take the photographs, then land at Barber's Point Naval Air Station on Oahu. The aircraft will remain in the islands for about a week, Arvesen said.

The ER-2 will take black and white, color, color infrared and digital images (using a thematic mapper simulator camera). The black and white film will be processed and analyzed in Hawaii. The other images immediately will be flown back to the mainland for processing at Ames.

- more -

The ER-2 is the modern successor to the 1950s vintage U-2. It is considered an exceptionally versatile research aircraft and well-suited for multiple mission work. Flying at 68,000 feet, the ER-2 operates above 95 percent of the Earth's atmosphere. At altitudes in that range, data gathered by the aircraft's sensors are similar to that gathered by space-based satellites.

Hurricane Andrew

NASA provided similar support to the State of Florida after Hurricane Andrew.

A Learjet from NASA's Stennis Space Center in Mississippi, equipped with a variety of sensors and cameras, gathered data in the South Miami-Homestead area on urban, suburban, farm and natural resource damage. This data enabled disaster officials to get a far-more-accurate picture of damage than they had obtained by on-the-ground inspections.

Achieving this degree of accuracy enabled the Governor's office to make a realistic cost estimate of the damage to present to the state legislature and to congressional committees in Washington.

The Stennis center also obtained pre-Andrew aerial photographs of the area from a commercial aerial photography firm. They will be used in conjunction with data from the Learjet mission to plan reconstruction and rehabilitation of natural resources.

- end -

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For Release

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September 17, 1992

RELEASE: 92-151

NASA SCIENTIST AWARDED RUSSIAN MEDAL FOR SPACE ACHIEVEMENT

Dr. Wesley T. Huntress, Jr., Director of NASA's Solar System Exploration Division, Washington, D.C., last week received the Korolev Medal, awarded by the Russian Federation of Astronautics and Cosmonautics for achievement in space research.

Dr. Huntress received the award at the sixth annual meeting of the U.S./Russia Joint Working Group on Solar System Exploration held in San Francisco. The award citation recognized his "great contribution to the development of Russian-American cooperation in solar system exploration." Recipients of the Korolev Medal have included cosmonauts, scientists and key individuals who have made significant contributions to space research.

"I'm especially pleased that Dr. Huntress has been recognized for this prestigious award," said Daniel S. Goldin, NASA Administrator. "It is another symbol of the close working relationship between NASA and our colleagues in the Russian Federation and the high level of esteem with which they -- and we -- regard him."

Dr. Huntress currently is responsible for leading the nation's planetary science and exploration program, including the ongoing missions of Ulysses, Magellan and Galileo and the upcoming Mars Observer mission.

Dr. Huntress has been Director of NASA's Solar System Exploration Division since July 1990. Prior to that, he served for 2 years as Special Assistant to the Director of the Earth Science and Applications Division. He came to NASA Headquarters after a 20-year career as a scientist at the Jet Propulsion Laboratory, Pasadena, Calif., where he participated in a number of projects including the Giotto Halley's Comet, the Comet Rendezvous Asteroid Flyby and Cassini missions.

At JPL, Dr. Huntress and his group gained international recognition for their pioneering studies of chemical evolution in interstellar clouds, comets and planetary atmospheres.

- end -

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September 17, 1992

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RELEASE: 92-152

FIRST STUDENT-BUILT ROCKET PAYLOAD SET FOR LAUNCH MONDAY

The first sounding rocket payload managed and built by students is scheduled for launch on a NASA Orion launch vehicle, Monday, Sept. 21, from NASA's Wallops Flight Facility, Wallops Island, Va.

Using surplus and donated equipment, the students will measure ozone density in the atmosphere above Wallops Island. Their data will be analyzed and compared with data gathered by NASA's Earth Radiation Budget Satellite.

The pilot project, known as the Colorado Student Ozone Atmospheric Rocket (CSOAR), was developed to demonstrate the use of sounding rocket flight as a valuable educational tool for undergraduate and graduate students.

This joint venture between NASA and the Space Grant Consortiums in Colorado and Virginia provides students hands-on experience in learning the basics of sounding rocket and science instrumentation, as well as learning about atmospheric ozone.

More than 50 graduate and undergraduate students from six participating Colorado colleges and universities have developed the CSOAR payload over the past 2 years. Virginia students are providing post-flight data comparison and public affairs support. NASA Wallops Flight Facility is providing engineering advisors, an Orion launch vehicle, payload recovery system and operational launch support.

- more -

The science instruments on the 140-pound (63 kg) CSOAR payload will begin taking data at about 15 miles (25 km) and will continue until the rocket reaches its highest altitude of 37 miles (60 km). The payload will descend by parachute and be recovered in the Atlantic Ocean off the Eastern Shore of Virginia. The total flight time is less than 30 minutes.

The participating Colorado universities are the University of Colorado at Boulder; University of Colorado at Colorado Springs; Fort Lewis College, Durango; Mesa State College, Grand Junction; Colorado State University, Fort Collins; and University of Southern Colorado, Pueblo. The Virginia universities participating in the CSOAR project are Old Dominion University, Norfolk, and Hampton University, Hampton.

The CSOAR launch is supported by the NASA Sounding Rocket program, which is managed at Wallops for NASA's Office of Space Science and Applications, Washington, D.C. The NASA program consists of approximately 30 sounding rockets launched each year from various worldwide locations.

- end -

NOTE TO EDITORS:

Members of the media are invited to cover the launch of the Colorado Student Ozone Atmospheric Rocket (CSOAR), currently scheduled for 12:30 p.m., Monday, Sept 21, from the NASA Wallops Flight Facility. Because of the variable nature of sounding rocket launches, the date and time are subject to change. A CSOAR status recording is available on (804) 824-2050.

Media wishing to attend the launch should contact the Wallops Public Affairs Office at (804) 824-1579 or 824-1584.

There will be a briefing at 11:15 a.m. the day of the launch at the Wallops' NASA Visitor Center. A CSOAR team member will profile the mission and supply additional background information. Media will leave 45-minutes prior to launch from the Visitor Center to the media viewing area.

A post-launch briefing will be held at the Visitor Center 1 hour after the launch. NASA representatives and students working on the CSOAR project will give a status report and the students will be available for one-on-one interviews at that time.

92-153

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SPACE SHUTTLE MISSION STS-52

PRESS KIT

LASER GEODYNAMICS SATELLITE (LAGEOS)

OCTOBER 1992

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RELEASE: 92-153 October 1992

COLUMBIA TO DEPLOY LAGEOS-II, SERVE AS TECHNOLOGY TESTBED

Shuttle flight STS-52 will be an ambitious mission, demonstrating the versatility of orbiter Columbia as a satellite launcher, science platform and technology testbed. Launch is planned for Oct. 15 from the Kennedy Space Center, Fla. The 9-day, 20-hour and 54-minute mission is scheduled to land on Oct. 25 at the Kennedy center.

A crew of six and 11 major payloads will be aboard Columbia's 13th mission, the 51st Space Shuttle flight. Mission Commander is James Wetherbee with Michael Baker the Pilot. Mission specialists are Charles Lacy Veach, William Shepherd and Tamara Jernigan. Steve MacLean is the Payload Specialist and the third Canadian citizen to fly aboard the Shuttle.

LAGEOS 2 - Small Satellite, Big Results

Columbia will eject the LAGEOS-II satellite from the cargo bay on the second mission day. Built by the Italian Space Agency using NASA blueprints, this small, 900-pound satellite will help geologists fill in important details about the Earth. The first LAGEOS was launched in 1976. Adding a second spacecraft will enable researchers to gather twice the data.

"The satellite may be small, but the data returned is big time science," says Program Scientist Dr. Miriam Baltuck. This information will be particularly useful for monitoring regional fault movement in earthquake-prone areas.

Baltuck said geologists use this information to monitor the extremely slow movements of the Earth's crustal plates, to measure and understand the "wobble" in the Earth's axis of rotation, collect information on the Earth's size and shape and more accurately determine the length of the day.

Baltuck explained that ground-based researchers from 30 countries will participate in collecting and analysing the data received from the satellite . The researchers will bounce laser beams off the mirror-covered spacecraft and log how long it takes the beams to make the round-trip voyage.

"We know the speed that light travels," said Baltuck. "So by plugging that into our formula, we can measure precisely the distances between stations on the Earth and the satellite."

USMP Makes Debut

A major new materials processing payload makes its debut on STS-52 -- the first United States Microgravity Payload (USMP-1). The payload consists of three experiments mounted on a new carrier, derived from the previously flown Materials Science Lab, in Columbia's cargo bay.

"This is an excellent use of the Shuttle to perform microgravity experiments that are primarily operated remotely from the ground," said Program Manager David Jarrett. This type of remote operations will help prepare the science community for Space Station Freedom prior to its permanently manned operational phase.

Experiments on USMP-1 will explore using the unique space environment to do research that is not possible on Earth. The science, while basic in nature, could impact applications on Earth in areas such as computer memory, metals and semiconductors. Another experiment will measure the Shuttle's vibrations, information critical to scientists understanding the current experiments and planning future experiments.

Canada Provides Variety of Experiments

Canadian Payload Specialist MacLean will perform a bevy of experiments called CANEX-2. Many of these experiments are extensions of work carried out by Dr. Marc Garneau as part of the CANEX group of experiments that flew in 1984.

CANEX-2 is actually 10 separate investigations. Results from CANEX-2 have potential applications in machine vision systems for use with robotic equipment in space and in environments such as mines and nuclear reactors. Other potential applications relate to the manufacturing of goods, the development of new protective coatings for spacecraft materials, improvements in materials processing, and a better understanding of Earth's stratosphere which contains the protective ozone layer.

Greater knowledge of human adaptation to microgravity is another objective of the CANEX-2 payload. MacLean will conduct experiments on back pain, body water changes and the effect of weightlessness on the vestibular system.

Columbia, An Orbiting Testbed

Columbia will be turned into an orbiting test-bed for other STS-52 experiments. One, called the Attitude Sensor Package built by the European Space Agency, will gather information on the performance and accuracy of new sensors. Space is the best place to test these sensors. The data returned could be used in the design of sensors for future spacecraft.

Other space technology experiments will examine how very cold liquids behave in space, the use of heat pipe technology for temperature control, and the effects of atomic oxygen on different materials -- technologies that may have important contributions to the design of future spacecraft.

Commercial Office Payloads

Major payloads, sponsored by NASA's Commercial Programs Office, will examine a compound for possible use in combating diseases which

involve loss of bone mass; thin-film membrane research which has potential application in the biotechnology and pollution control field; and a new facility for growing semiconductor crystals which permits interaction from the crew to achieve optimum growth.

A commercial protein crystal growth facility will fly on STS-52. Scientists hope the new facility will result in more crystals that are better ordered, larger and more uniform in size than their ground-based counterparts.

With the exception of the Canadian Payload Specialist, there are no "rookie" astronauts on this flight. STS-52 will mark Wetherbee's second Shuttle flight. He was the Pilot on the STS-32 Columbia mission. Baker also will be making his second flight, but his first as a Pilot. Baker was a mission specialist on STS-43.

Veach, Shepherd and Jernigan are Shuttle veterans. Veach previously flew on STS-39, and Shepherd has two previous flights, STS-27 and -41. Jernigan last flew on STS-40, a Columbia mission devoted to life sciences research.

MacLean is one of six Canadian astronauts selected in December 1983. In addition to his CANEX-2 duties, he is the Program Manager for the Advanced Space Vision System experiment.

-end of general release-

MEDIA SERVICES INFORMATION

NASA Select Television Transmission

NASA Select television is available on Satcom F-2R, Transponder 13, located at 72 degrees west longitude; frequency 3960.0 MHz, audio 6.8 MHz.

The schedule for television transmissions from the orbiter and for mission briefings will be available during the mission at Kennedy Space Center, Fla; Marshall Space Flight Center, Huntsville, Ala.; Ames-Dryden Flight Research Facility, Edwards, Calif.; Johnson Space Center, Houston and NASA Headquarters, Washington, D.C. The television schedule will be updated to reflect changes dictated by mission operations.

Television schedules also may be obtained by calling COMSTOR 713/483-5817. COMSTOR is a computer data base service requiring the use of a telephone modem. A voice recording of the television schedule is updated daily at noon Eastern time.

Status Reports

Status reports on countdown and mission progress, on-orbit activities and landing operations will be produced by the appropriate NASA newscenter.

Briefings

A mission press briefing schedule will be issued prior to launch. During the mission, change-of-shift briefings by a flight director and the science team will occur at least once per day. The updated NASA Select television schedule will indicate when mission briefings are planned.

STS-52 QUICK LOOK

Launch Date and Site:	Oct. 15, 1992 Kennedy Space Center, Fla. -- Pad 39B
Launch Window:	11:10 a.m. EDT (1510 GMT) to 1:37 p.m. EDT (1737 GMT)
Orbiter:	Columbia's 13th Flight
Orbit/Inclination:	160 x 163 nm (LAGEOS)/ 28.45 degrees 110 x 111 nm (CANEX)/ 28.45 degrees
Landing Time/Date:	8:04 a.m. EDT (1204 GMT)/Oct. 25
Primary Landing Site:	Kennedy Space Center, Fla.
Abort Landing Sites	
Return To Launch Site Abort:	Kennedy Space Center, Fla.
TransAtlantic Abort Landing:	Banjul, The Gambia -- Prime Ben Guerir, Morroco -- Alternate Moron, Spain -- Alternate
Abort-Once-Around:	Edwards AFB, Calif. -- Prime KSC, Fla./White Sands, N.M. -- Alternates
Crew:	James Wetherbee - Commander Michael Baker - Pilot Charles Lacy Veach - MS1 William Shepherd - MS2 Tamara Jernigan - MS3 Steven MacLean - PS1
Cargo Bay Payloads:	Laser Geodynamics Satellite (LAGEOS) U.S. Microgravity Payload (USMP-1) Canadian Experiments (CANEX-2) Attitude Sensor Package (ASP) Tank Pressure Control Exp. (TPCE)
Middeck Payloads:	Commercial Protein Crystal Growth (CPCG) Commercial Materials ITA Exp. (CMIX) Crystals by Vapor Transport Exp. (CVTE) Heatpipe Performance Experiment (HPP) Physiological Systems Experiment (PSE) Shuttle Plume Impingement Exp. (SPIE)

STS-52 SUMMARY OF MAJOR ACTIVITIES

Flight Day One
Launch/Post Insertion
LAGEOS Checkout

Flight Day Two
LAGEOS Deploy
Robot Arm (RMS) Checkout
Heatpipe Performance Experiment (HPP)

Flight Day Three
Lower Body Negative Pressure (LBNP)
Space Vision Systems Operations (CANEX)
HPP

Flight Day Four
HPP
Commercial Protein Crystal Growth (CPCG)

Flight Day Five
LBNP/HPP

Flight Day Six
LBNP/CPCG/HPP
Phase Partitioning in Liquids (CANEX)
Crystals by Vapor Transport Experiment Setup/Activation

Flight Day Seven
LBNP/CPCG
Phase Partitioning in Liquids

Flight Day Eight
LBNP
Material Exposure in Low Earth Orbit (CANEX)
Attitude Sensor Package Maneuvers

Flight Day Nine
LBNP/SVS Operations
Material Exposure in Low Earth Orbit (MELEO)
Orbiter Glow Experiment (OGLOW)

Flight Day Ten
Canadian Target Assembly Release
Flight Control Surface Checkout
Reaction Control System Hotfire
Cabin Stow

Flight Day Eleven
Deorbit Preparation
Deorbit Burn and Landing at Kennedy Space Center

STS-52 VEHICLE AND PAYLOAD WEIGHTS

Vehicle/Payload	Pounds
Orbiter Columbia Empty and three SSMEs	181,502
Laser Geodynamics Satellite (LAGEOS)	5,512
LAGEOS Support Equipment	2,214
U.S. Microgravity Payload (USMP-1)	8,748
Attitude Sensor Package (ASP)	632
Canadian Experiments (CANEX-2)	301
Commercial Protein Crystal Growth (CPCG)	63
Heatpipe Performance Experiment (HPP)	100
Physiological Systems Experiment (PSE)	142
Detailed Supplementary Objectives (DSO)	96
Total Vehicle at Solid Rocket Booster Ignition	4,511,341
Orbiter Landing Weight	214,289

STS-52 TRAJECTORY SEQUENCE OF EVENTS

EVENT	Elapsed Time (d/h:m:s)	Velocity (fps)	Mach	Altitude (feet)
Launch	00/00:00:00			
Begin Roll Maneuver	00/00:00:10	188	.17	799
End Roll Maneuver	00/00:00:14	299	.26	1,956
SSME Throttle To 67 Percent	00/00:00:29	692	.62	8,573
Max. Dynamic Press (Max Q)	00/00:01:00	1,371	1.36	34,977
SSME Throttle Up (104 Percent)	00/00:01:06	1,576	1.63	42,771
SRB Separation	00/00:02:04	4,111	3.84	151,131
Main Engine Cutoff (MECO)	00/00:08:31	24,512	22.73	363,666
Zero Thrust	00/00:08:37	24,509		362,770
Fuel Tank Separation	00/00:08:50			
OMS-2 Burn	00/00:39:55			
Deorbit Burn (orbit 158)	09/19:54:00			
Landing at KSC (orbit 159)	09/20:54:00			

Apogee, Perigee at MECO: 156 x 35 nautical miles
Apogee, Perigee after OMS-2: 163 x 160 nautical miles

SPACE SHUTTLE ABORT MODES

Space Shuttle launch abort philosophy aims toward safe and intact recovery of the flight crew, orbiter and its payload. Abort modes include:

* Abort-To-Orbit (ATO) -- Partial loss of main engine thrust late enough to permit reaching a minimal 105-nautical mile orbit with orbital maneuvering system engines.

* Abort-Once-Around (AOA) -- Earlier main engine shutdown with the capability to allow one orbit around before landing at either Edwards Air Force Base, Calif., White Sands Space Harbor, N.M., or the Shuttle Landing Facility (SLF) at the Kennedy Space Center, Fla.

* Trans-Atlantic Abort Landing (TAL) -- Loss of one or more main engines midway through powered flight would force a landing at either Banjul, The Gambia; Ben Guerir, Morocco; or Moron, Spain.

* Return-To-Launch-Site (RTLS) -- Early shutdown of one or more engines without enough energy to reach Banjul would result in a pitch around and thrust back toward KSC until within gliding distance of the Shuttle Landing Facility.

STS-52 contingency landing sites are Edwards Air Force Base, the Kennedy Space Center, White Sands Space Harbor, Banjul, Ben Guerir and Moron.

STS-52 Prelaunch Processing

With three other vehicles at various processing stages, the KSC's Shuttle team began work on July 10 to ready Columbia for its 13th voyage into space - the day after its unscheduled landing at KSC. Columbia was towed to Orbiter Processing Facility (OPF) bay 1 where post-flight inspections and tests were accomplished.

In August, technicians installed the Shuttle orbiter main engines. Engine 2030 is in the number 1 position, engine 2015 is in the number 2 position and engine 2028 is in the number 3 position.

Following completion of space vehicle assembly and associated testing, the Terminal Countdown Demonstration Test with the STS-52 flight crew was scheduled for late September.

A standard 43-hour launch countdown is scheduled to begin 3 days prior to launch. During the countdown, the orbiter's fuel cell storage tanks and all orbiter systems will be prepared for flight.

About 9 hours before launch, the external tank will be filled with its flight load of a half million gallons of liquid oxygen and liquid hydrogen propellants. About 2 and one-half hours before liftoff, the flight crew will begin taking their assigned seats in the crew cabin.

Columbia's end-of-mission landing is planned at Kennedy Space Center's Shuttle Landing Facility. KSC's landing and recovery team will perform convoy operations on the runway to safe the vehicle and prepare it for towing to the OPF.

Columbia's next flight, STS-55, targeted for early next year, is a 10-day mission with the German Spacelab D-2 module.

LASER GEODYNAMICS SATELLITE (LAGEOS) II

The Laser Geodynamics Satellite (LAGEOS) II, like its predecessor launched in 1976, is a passive satellite dedicated exclusively to laser ranging. Laser ranging involves sending laser beams from Earthto the satellite and recording the round-trip travel time. This measurement enables scientists to precisely measure the distances between laser ranging stations on the Earth and the satellite.

LAGEOS is designed to provide a reference point for laser ranging experiments that will monitor the motion of the Earth's crust, measure and understand the "wobble" in the Earth's axis of rotation, collect information on the Earth's size and shape and more accurately determine the length of the day. The information will be particularly useful for monitoring regional fault movement in earthquake-prone areas such as California and the Mediterranean Basin.

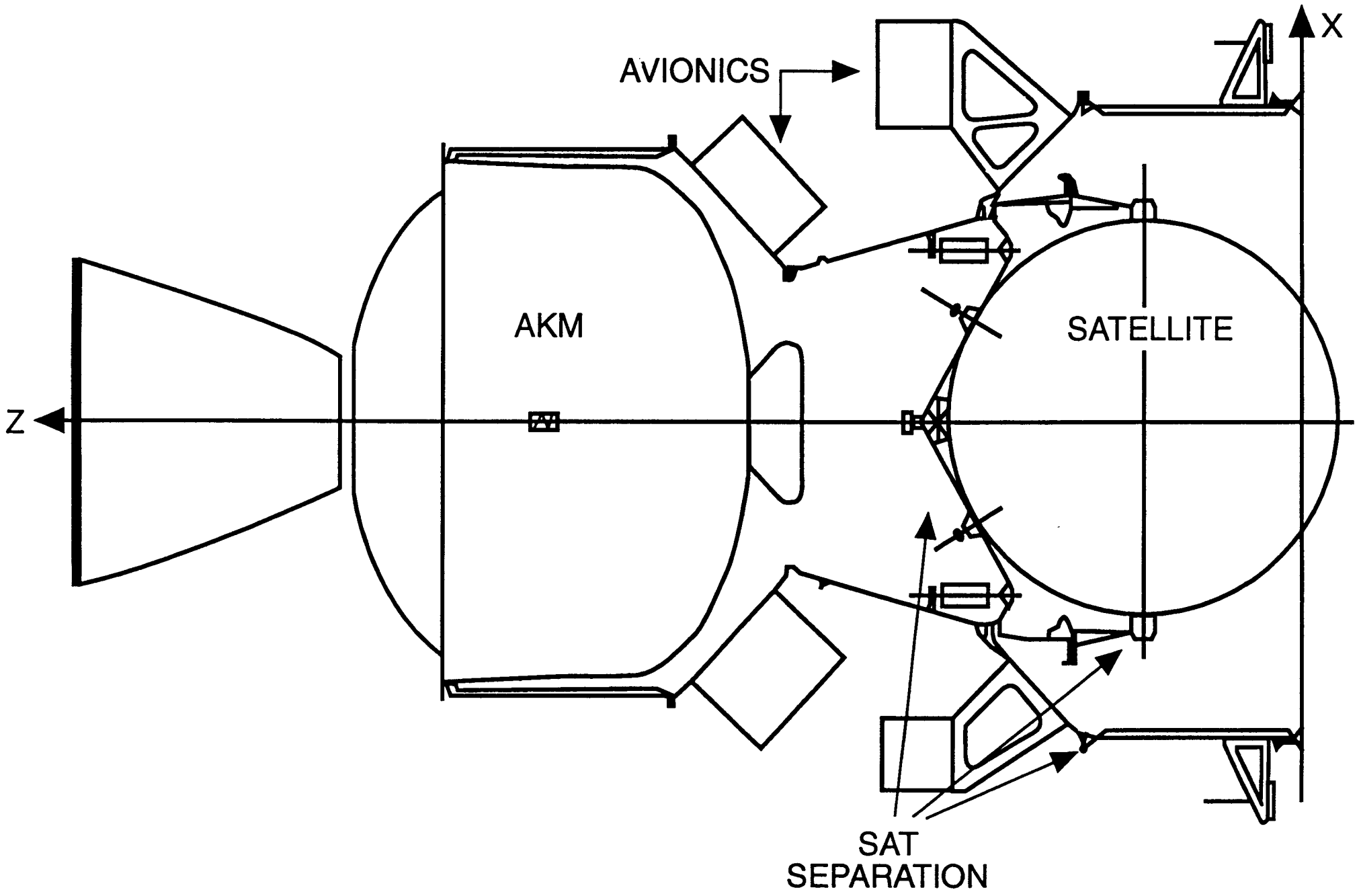
The LAGEOS II project is a joint program between NASA and the Italian space agency, Agenzia Spaziale Italiana (ASI), which built the satellite using LAGEOS I drawings and specifications, handling fixtures, dummy spacecraft and other materials provided by the Goddard Space Flight Center (GSFC), Greenbelt, Md. GSFC also tested the corner-cube retroreflectors on the surface of LAGEOS II. ASI provided the Italian Research Interim Stage (IRIS) and the LAGEOS Apogee Stage (LAS), the two upper stages that will transport LAGEOS II to its proper altitude and circularize its orbit. NASA is providing the launch aboard Space Shuttle Columbia.

The Spacecraft

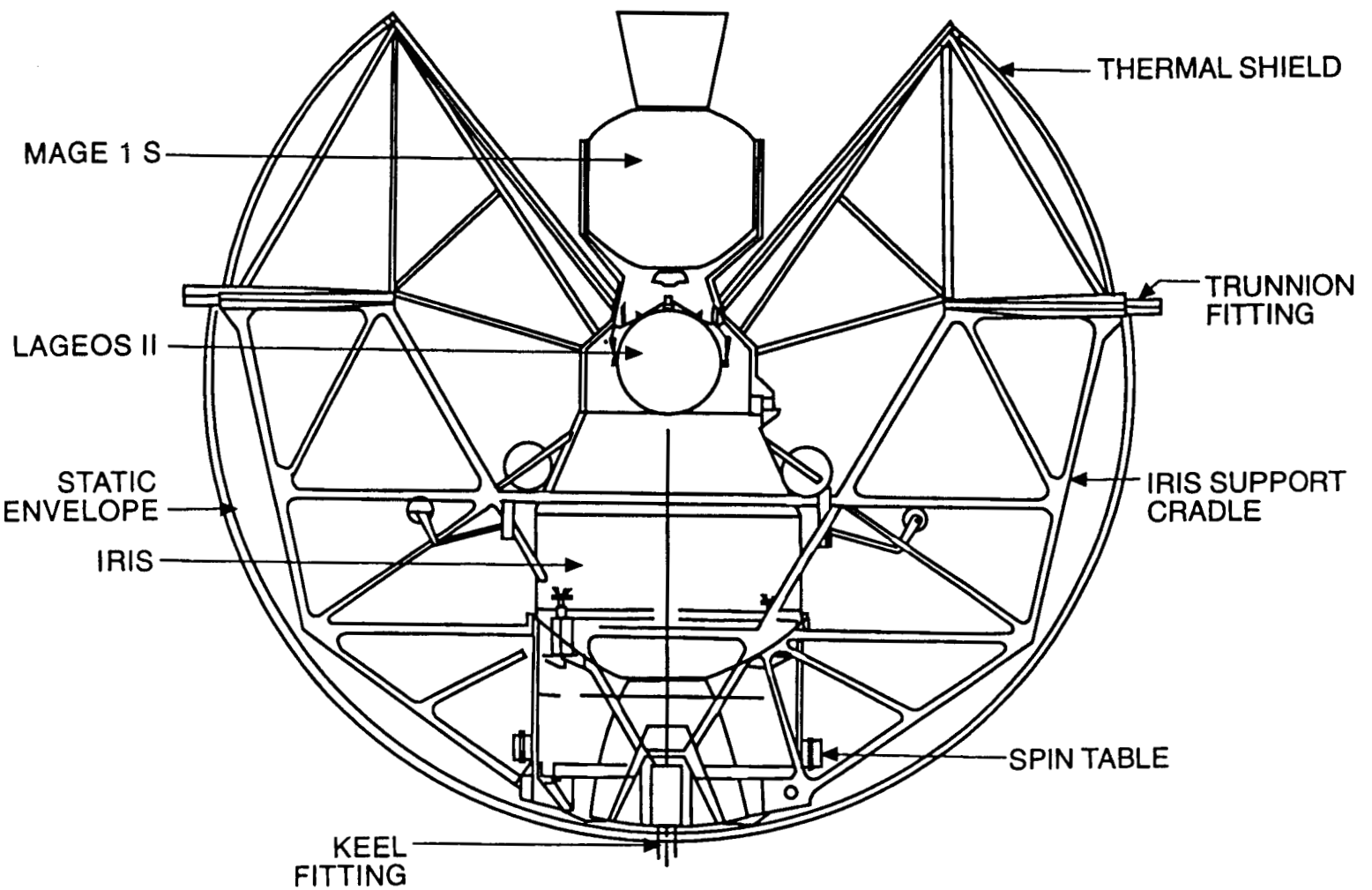
The LAGEOS II satellite is a spherical satellite made of aluminum with a brass core. It is only 24 inches (60 cm) in diameter yet it weighs approximately 900 pounds (405 kg). This compact, dense design makes the satellite's orbit as stable as possible.

The LAGEOS design evolved from several trade-offs that proved necessary to achieve the program objectives. For example, the satellite had to be as heavy as possible to minimize the effects of non-gravitational forces, yet light enough to be placed in a high orbit. The satellite had to be big enough to accommodate many retroreflectors, but small enough to minimize the force of solar pressure.

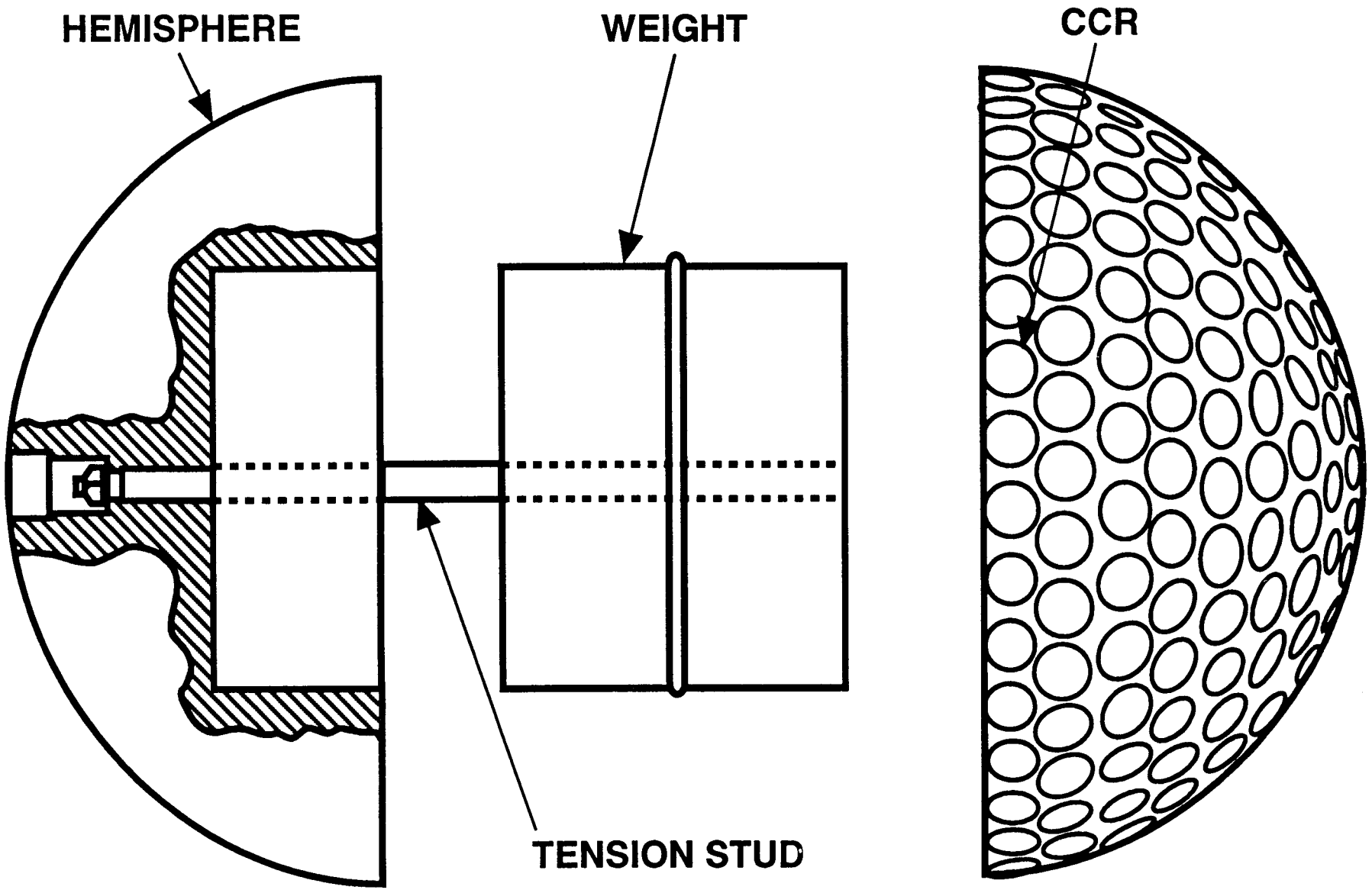
Aluminum would have been too light for the entire body of the sphere. Design engineers finally decided to combine two aluminum hemispheres bolted together around a brass core. They selected the materials to reduce the effects of the Earth's magnetic field. LAGEOS II should remain in orbit indefinitely.


AVIONICS
X
AKM
SATELLITE
Z
SAT
SEPARATION

LAGEOS II —
LAUNCH CONFIGURATION



LAGEOS II SATELLITE



LAGEOS II has the dimpled appearance of a large golf ball. Imbedded into the satellite are 426 nearly equally spaced, cube-corner retroreflectors, or prisms. Most of the retroreflectors (422) are made of suprasil, a fused silica glass. The remaining four, made of germanium, may be used by lasers of the future. About 1.5 inches (3.8 cm) in diameter, each retroreflector has a flat, circular front-face with a prism-shaped back.

The retroreflectors on the surface of LAGEOS II are three-dimensional prisms that reflect light, in this case a laser beam, directly back to its source. A timing signal starts when the laser beam leaves the ground station and continues until the pulse, reflected from one of LAGEOS II's retroreflectors, returns to the ground station.

Since the speed of light is constant, the distance between the station and the satellite can be determined. This process is known as satellite laser ranging (SLR). Scientists use this technique to measure movements of the Earth's surface up to several inches per year. By tracking the LAGEOS satellites for several years, scientists can characterize these motions and perhaps correlate them with Earth dynamics observed on the ground.

Launch, Orbit Insertion And Data Collection

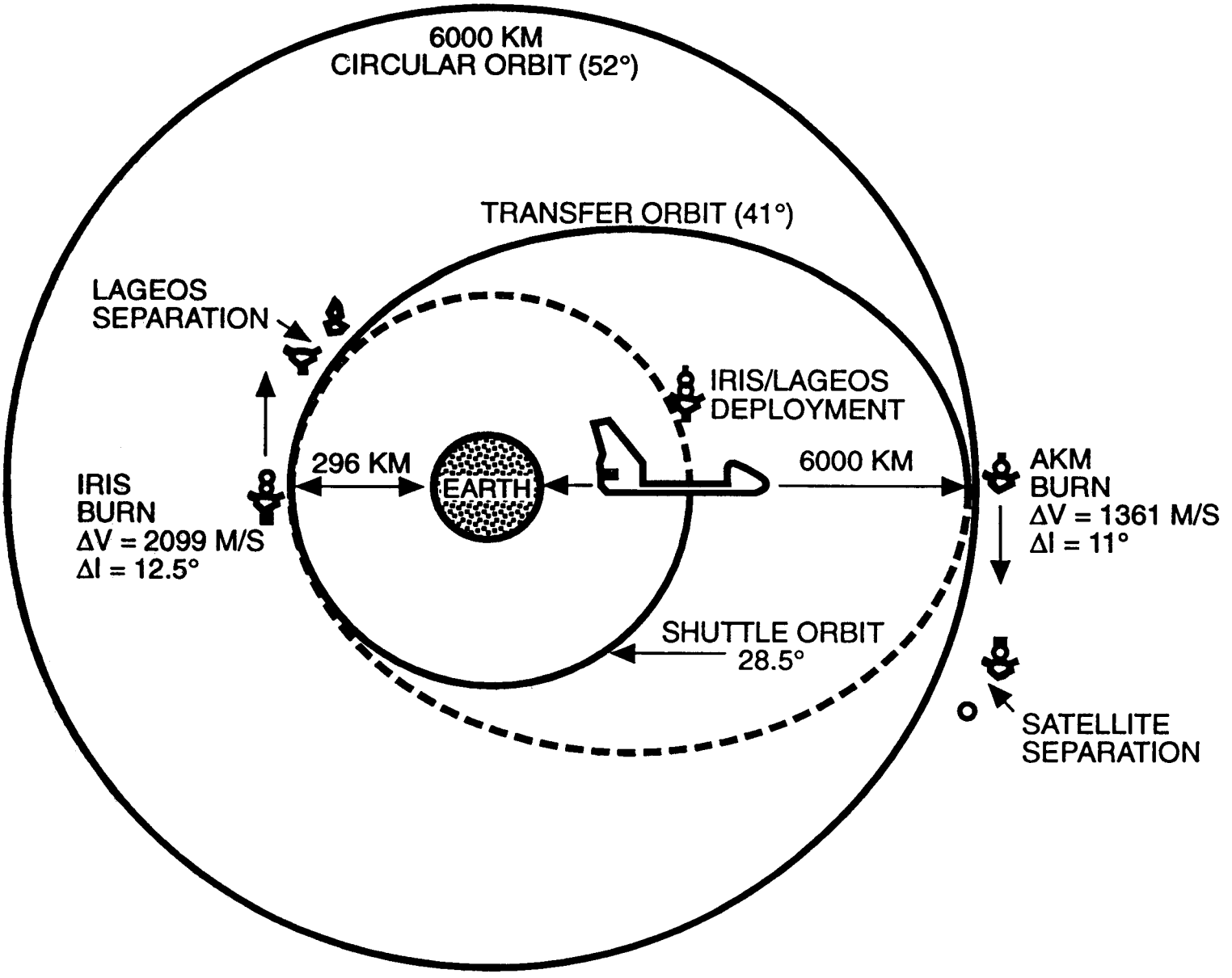
After the Shuttle releases LAGEOS II, two solid-fuel stages, the Italian Research Interim Stage (IRIS) and the LAGEOS Apogee Stage (LAS), will engage. The IRIS will boost LAGEOS II from the Shuttle's 184-mile (296 km) parking orbit to the satellite injection altitude of 3,666 miles (5,900 km). The LAS will circularize the orbit. This will be the first IRIS mission and will qualify the IRIS, a spinning solid fuel rocket upper stage, for use in deploying satellites from the Space Shuttle cargo bay.

LAGEOS II's circular orbit is the same as that of LAGEOS I, but at a different angle to the Earth's equator: 52 degrees for LAGEOS II and 110 degrees for LAGEOS I. The complementary orbit will provide more coverage of the seismically active areas such as the Mediterranean Basin and California, improving the accuracy of crustal-motion measurements. It also may help scientists understand irregularities noted in the position of LAGEOS I, which appear to be linked to erratic spinning of the satellite itself.

LAGEOS II will undergo a very intensive tracking program in its first 30 days of flight. This will allow laser ranging stations to precisely calculate and predict the satellite's orbit. By the end of the 30 days, full science operations will have begun.

NASA operates 10 SLR stations. Four are Transportable Laser Ranging Systems (TLRS), built to be moved easily from location to location. Four Mobile Laser Ranging Systems (MOBLAS) are in semi-permanent locations in Australia and North America, including GSFC. The University of Hawaii and the University of Texas at Austin operate the other two NASA systems.

LAGEOS II ORBIT SCHEMATIC



NASA and ASI have selected 27 LAGEOS II science investigators from the United States, Italy, Germany, France, the Netherlands and Hungary. The investigators will obtain and interpret the scientific results that come from measurements to the satellite. By tracking both LAGEOS I and LAGEOS II, scientists will collect more data in a shorter time span than with LAGEOS I alone.

Data from LAGEOS II investigations will be archived in the Crustal Dynamics Data and Information System (CDDIS) at GSFC. It will be available worldwide to investigators studying crustal dynamics.

U.S. MICROGRAVITY PAYLOAD 1 (USMP)

The first U.S. Microgravity Payload (USMP-1) will be launched aboard Space Shuttle Columbia for a 10-day mission. The USMP program is a series of NASA missions designed for microgravity experiments that do not require the "hands-on" environment of the Spacelab. The Marshall Space Flight Center (MSFC), Huntsville, Ala., manages USMP for NASA's Office of Space Science and Applications.

The USMP-1 payload will carry three investigations. The Lambda-Point Experiment (LPE) will study fluid behavior in microgravity. The Materials for the Study of Interesting Phenomena of Solidification on Earth and in Orbit, (Materiel pour l'Etude des Phenomenes Interessant la Solidification sur Terre et'en Orbite, or MEPHISTO) will study metallurgical processes in microgravity. The Space Acceleration Measurement System (SAMS) will study the microgravity environment onboard the Space Shuttle.

In orbit, the crew will activate the carrier and the experiments, which will operate for about 6 days during the mission. Science teams at MSFC's Payload Operations Control Center will command and monitor instruments and analyze data.

Two Mission-Peculiar Equipment Support Structures (MPESS) in the Shuttle cargo bay make up USMP-1. Carrier subsystems mounted on the front MPESS provide electrical power, communications, data-handling capabilities and thermal control. MSFC developed the USMP carrier.

Lambda-Point Experiment (LPE)

Principal Investigator: Dr. J.A. Lipa, Stanford University, Stanford, Calif.
Project Manager: R. Ruiz, Jet Propulsion Laboratory, Pasadena, Calif.

The Lambda-Point Experiment will study liquid helium as it changes from normal fluid to a superfluid state. In the superfluid state, helium moves freely through small pores that block other liquids, and it also conducts heat 1,000 times more effectively than copper. This change occurs at liquid helium's "lambda point" (-456 degrees Fahrenheit or 2.17 degrees Kelvin). Because the transition from one phase to another causes the organized interaction of large numbers of particles, it is of great scientific interest.

The transition from fluid to superfluid state can be studied more closely in microgravity than on Earth. Gravity causes a sample of liquid helium to have greater pressure at the bottom than at the top, in turn causing the top of the sample to become superfluid at higher temperatures.

Onboard USMP, a sample of helium cooled far below its lambda point will be placed in a low-temperature cryostat (an apparatus used to keep something cold, such as a thermos bottle). During a series of 2-hour runs controlled by an onboard computer, the helium's temperature will be raised through the transition point by a precision temperature-control system. Sensitive instruments inside the cryostat will measure the heat capacity of the liquid helium as it changes phases. The temperature of the helium sample will be maintained to within a billionth of degree during the experiment.

Materials for the Study of Interesting Phenomena of Solidification on Earth and in Orbit (MEPHISTO)

Principal Investigator: Dr. J. J. Favier, Commissariat a' l' Energie Atomique, Grenoble, France
Project Manager: G. Cambon, Centre National d'Etudes Spatiales, Toulous

MEPHISTO is a joint American-French cooperative program. The definition and development of the flight hardware has been led by CNES (French Space Agency) and CEA (French Atomic Energy Commission). This mission will be the first of a series of six flights, about 1 per year, provided by NASA on the USMP carrier.

MEPHISTO will study the behavior of metals and semiconductors as they solidify to help determine the effect gravity has during solidification at the point where solid meets liquid, called the solid/liquid interface. Data gathered from MEPHISTO will be used to improve molten materials. For example, more resilient metallic alloys and composite materials could be designed for engines that will power future aircraft and spacecraft.

The cylindrical-shaped MEPHISTO furnace experiment will contain three identical rod-shaped samples of a tin-bismuth alloy. MEPHISTO will process the samples using two furnaces, one fixed and one moving. As a run begins, the mobile furnace will move outward from the fixed furnace, melting the samples. The mobile furnace then moves back toward the fixed furnace, and the sample resolidifies. The fixed furnace contains a stationary solid/liquid interface to be used as a reference for studying the mobile solid/liquid interface.

MEPHISTO has been designed to perform quantitative investigations of the solidification process by using several specific diagnosis methods. During the experiment runs, a small electrical voltage will constantly measure the temperature changes at the interface to verify solidification rates. During the last experimental run, electrical pulses will be sent through one sample, "freezing" the shape of the interface for post-mission analysis.

The MEPHISTO apparatus allows many cycles of solidification and remelting and is particularly well-adapted for long-duration missions. During the mission, scientists will compare the electrical signal to data from a SAMS sensor to see if the Shuttle's movement is disturbing the interface. They then can make adjustments to the experiments if necessary. Post-mission analysis of the space-solidified sample will allow correlation between the electrical measurements and changes in the sample.

Space Acceleration Measurement System (SAMS)

Scientific Investigator: Charles Baugher, MSFC, Huntsville, Ala.
Project Manager: R. De Lombard, Lewis Research Center, Cleveland

The Space Acceleration Measurement System (SAMS) is designed to measure and record low-level acceleration during experiment operations. The signals from these sensors are amplified, filtered and converted to digital data before it is stored on optical disks and sent via downlink to the ground control center.

USMP-1 will be the first mission for two SAMS flight units in the cargo bay configuration. The two units each will support two remote sensor heads. Two heads will be mounted in the Lambda Point Experiment (LPE) and the other two heads will be mounted to the MPESS structure near the MEPHISTO furnace.

Some of the data will be recorded on optical disks in the SAMS units, while other data will be down-linked to the Marshall Spaceflight Center's Payload Operations Control Center.

The down-linked SAMS data will be utilized during experiment operations by the principal investigators (PI) involved with LPE and MEPHISTO. The SAMS data also will be monitored by the SAMS project team.

The PIs will look for acceleration events or conditions that exceed a threshold where the experiment results could be affected. This may be, for example, a frequency versus amplitude condition, an energy content condition or simply an acceleration magnitude threshold. Experiment operations may be changed based on the observed microgravity environment.

SAMS flight hardware was designed and developed in-house by the NASA Lewis Research Center and Sverdrup Technology Inc. project team. The units have flown on STS-40, STS-43, STS-42, STS-50 and STS-47 missions.

ATTITUDE SENSOR PACKAGE (ASP)

STS-52 will carry the third Hitchhiker payload to fly in space. Hitchhikers are a part of Goddard Space Flight Center's (GSFC) Shuttle Small Payloads Project (SSPP). Hitchhiker provides quick-response, economical flights for small attached payloads that have more complex requirements than Get Away Special experiments.

The STS-52 Hitchhiker payload carries one foreign reimbursable experiment, the Attitude Sensor Package (ASP) experiment. This experiment was prepared by the In-Orbit Technology Demonstration Programme of the European Space Agency (ESA).

The ASP experiment consists of three unique spacecraft attitude sensors, an on board computer and a support structure. The primary sensor is the Modular Star Sensor (MOSS). The other two sensors are the Yaw Earth Sensor (YESS) and the Low Altitude Conical Earth Sensor (LACES). The ASP sensors and their support structure are assembled on a Hitchhiker small mounting plate. The Hitchhiker avionics, mounted to another small mounting plate, provides power and signal interfaces between the ASP experiment and the Shuttle.

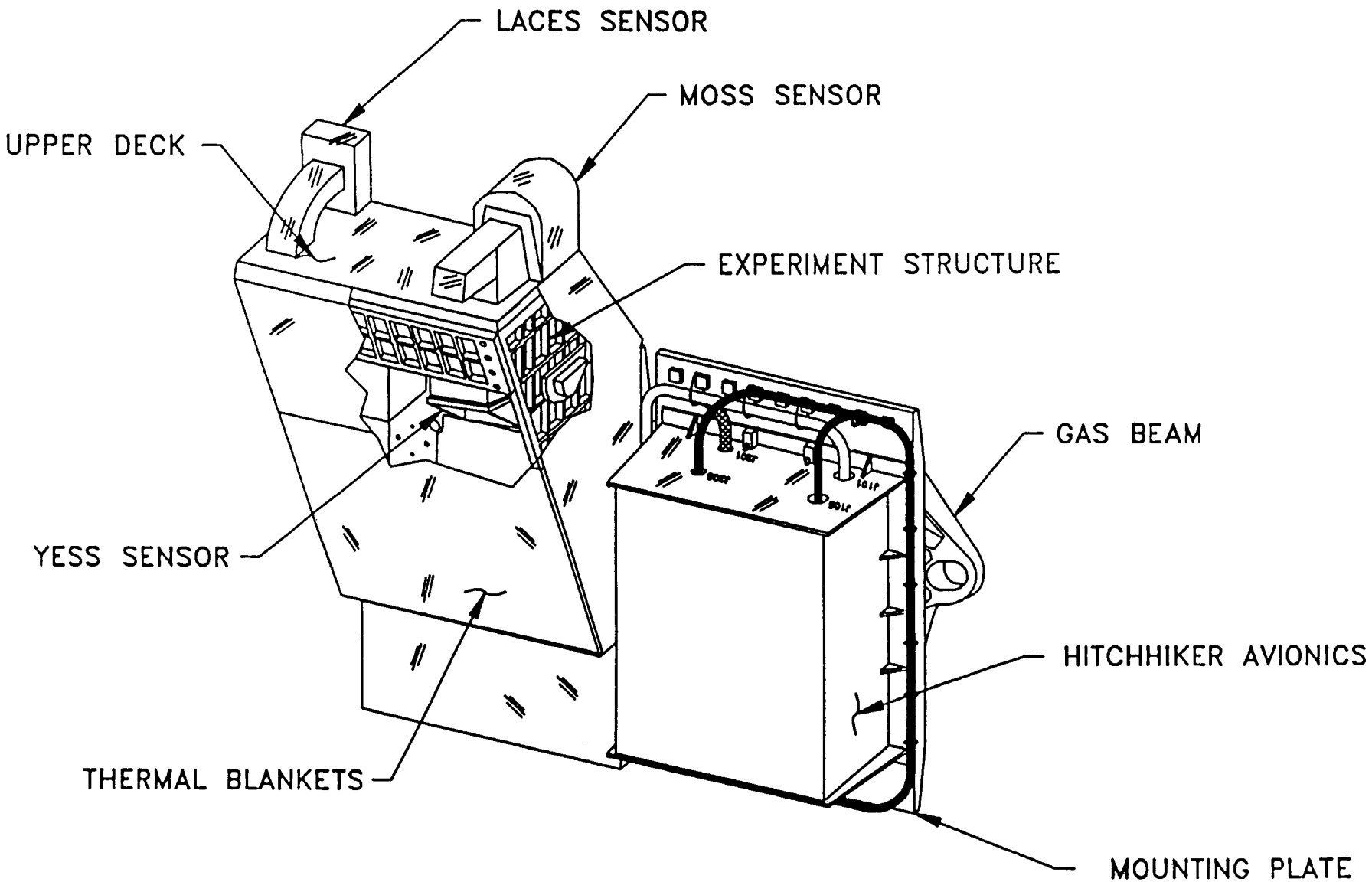
Often the performance of the space instruments cannot be predicted accurately on Earth because of the lack of knowledge of and actual simulation of the space environment. The ASP experiment exposes these attitude sensors to actual space conditions, demonstrating their performance and accuracy. This flight experience will be evaluated by ESA for possible use of these sensors on future ESA programs.

During the mission, the ASP experiment will operate for 16 orbits from the Hitchhiker Payload Operations Control Center (POCC) located at GSFC, Greenbelt, Md. ESA personnel and contractors will operate their ground support equipment in the POCC during the Shuttle flight.

The SSPP is managed by Goddard for NASA's Office of Space Flight. The Hitchhiker Program, managed by the SSPP, performs overall mission management duties for Hitchhiker payloads flying on the NASA Shuttle, including experiment integration on the Shuttle and operations management during the flight.

Theodore C. Goldsmith is SSPP Project Manager. Chris Dunker is Goddard's ASP mission manager. The In-Orbit Technology Demonstration Programme Manager for ESA is Manfred Trischberger, the ESA ASP payload Manager is Roberto Aceti and the ESA Principal Investigator is Peter Underwood. The In-Orbit Technology Demonstration Programme is part of the European Space Technology and Engineering Center, Noordwijk, The Netherlands.

ASP CONFIGURATION



CANADIAN EXPERIMENTS (CANEX)

The Canadian Space Agency

The Canadian Space Agency (CSA) was formed in 1989 with a mandate to promote the peaceful use and development of space, to advance the knowledge of space through science and to ensure that space science and technology provide social and economic benefits for Canadians.

To meet these objectives, CSA coordinates a variety of programs involving space science, space technology, Space Station development, satellite communications, remote sensing and human space flight. An integral part of CSA, the Canadian Astronaut Program, supports space research and development in close cooperation with scientists and engineers in government, universities and the private sector. These investigations focus on space science, space technology and life sciences research carried out on Earth and in space.

Canadian Experiments-2 (CANEX-2)

CANEX-2 is a group of space technology, space science, materials processing and life sciences experiments which will be performed in space by Canadian Payload Specialist Dr. Steve MacLean during the STS-52 mission of Space Shuttle Columbia. Bjarni Tryggvason is a backup crew member and alternate to Dr. MacLean for this mission.

The potential applications of CANEX-2 space research include machine vision systems for use with robotic equipment in space and in environments such as mines and nuclear reactors. Other potential applications relate to the manufacturing of goods, the development of new protective coatings for spacecraft materials, improvements in materials processing, a better understanding of the stratosphere which contains the protective ozone layer, and greater knowledge of human adaptation to microgravity.

Many of these experiments are extensions of the work carried out by Dr. Marc Garneau as part of the CANEX group of experiments that helped form his 1984 mission.

Space Vision System Experiment (SVS)

Principal Investigator: Dr. H.F. Lloyd Pinkney, National Research Council of Canada, Ottawa, Ontario.

Space is a difficult visual environment with few reference points and frequent periods of extremely dark or bright lighting conditions. Astronauts working in space find it difficult to gauge the distance and speed of objects such as satellites.

The development of the Space Vision System (SVS), a machine vision system for robotic devices, such as the Canada arm, was undertaken to enhance human vision in the unfavorable viewing conditions of space. The

SVS can provide information on the exact location, orientation and motion of a specified object. Dr. MacLean will evaluate an experimental Space Vision System for possible use in the Space Shuttle and in the construction of Space Station Freedom.

The Space Vision System uses a Shuttle TV camera to monitor a pattern of target dots of known spacing arranged on an object to be tracked. As the object moves, the SVS computer measures the changing position of the dots and provides a real-time TV display of the location and orientation of the object. This displayed information will help an operator guide the Canada arm or the Mobile Servicing System (MSS) when berthing or deploying satellites.

For the CANEX-2 experiments, target dots have been placed on the Canadian Target Assembly (CTA), a small satellite carried in the Space Shuttle's cargo bay. During the flight, a mission specialist will use the arm to deploy the CTA and take it through a series of maneuvers using the information displayed by the SVS. Dr. MacLean will evaluate SVS performance and investigate details that need to be considered to design a production model of the system.

Beyond its possible application as a computerized eye for the Space Shuttle, a system derived from the Space Vision System may be used to help construct and maintain the Space Station. In another application, an SVS-based system could guide small, remotely-operated space vehicles for satellite retrieval and servicing. On Earth, advances in machine vision could lead to improvements in the manufacturing of products, in auto plants for example, and to applications involving work in environments such as mines or nuclear reactors.

SPACE TECHNOLOGY AND SCIENCE EXPERIMENTS

Materials Exposure in Low-Earth Orbit (MELEO)

Principal Investigator: Dr. David G. Zimcik, Canadian Space Agency, Ottawa, Ontario.

Plastics and composite materials used on the external surfaces of spacecraft have been found to degrade in the harsh environment of space. Evidence suggests that this degradation is caused by interaction with atomic oxygen which induces damaging chemical and physical reactions. The result is a loss in mass, strength, stiffness and stability of size and shape.

The MELEO experiment is an extension of work performed by the CSA which began with the Advanced Composite Materials Experiment (ACOMEX) flown on Marc Garneau's 1984 mission. Researchers now want to extend the valuable baseline date obtained to further investigate the deterioration process, try new protective coatings and test materials designed for use on specific space hardware such as the Mobile Servicing System (MSS) for the Space Station Freedom and RADARSAT, the Canadian remote sensing satellite scheduled for launch in early 1995.

The MELEO experiment will expose over 350 material specimens mounted on "witness plates" on the Canada arm and analyzed after the mission. Typical spacecraft materials will be tested along with new developments in protective measures against atomic oxygen. The specimens will be exposed in the flight direction for at least 30 hours. Dr. MacLean periodically will photograph the specimens to record the stages of erosion. All materials will be returned to Earth for detailed examination.

The MELEO experiment uses active elements called Quartz Crystal Microbalances (QCM's), attached to the end of the Canada arm, to measure the erosion of material with a very high degree of accuracy. Their electrical functions are regulated by a controller located on the aft flight-deck of the Shuttle orbiter. Data will be recorded using the on-board Payload General Service Computer (PGSC). This will enable the Canadian Payload Specialist to have real-time readouts of the erosion data during the mission.

It is expected that the MELEO experiment will provide data on the performance of new materials exposed to the true space environment and provide information to be used in the development of effective ground-based space simulation facilities capable of testing and screening spacecraft materials in the laboratory.

Orbiter Glow-2 (OGLOW-2)

Principal Investigator: Dr. E.J. (Ted) Llewellyn, University of Saskatchewan, Saskatoon.

Photographs taken by astronauts have revealed a glow emanating from Shuttle surfaces facing the direction of motion. This phenomenon is thought to be caused by the impact of high-velocity atoms and the effect of the orbiter's surface temperature.

In the first OGLOW experiment, Dr. Marc Garneau successfully photographed the glow phenomenon. Computer analysis of these photographs and of corresponding video recordings revealed the bright areas to be concentrated around the Shuttle's tail section instead of around the entire Shuttle, as had been expected.

Additional data, obtained when Dr. Garneau took several photographs while the Shuttle's thrusters were firing, led to the need for an OGLOW-2 experiment. This experiment will explore in greater detail the gaseous reactions caused by the orbiter thrusters through the post-flight analysis of the thruster-induced glow spectrum.

Photographs of the Shuttle's tail, primarily while the thrusters are firing, will be taken. On-board TV cameras will obtain corresponding video recordings. The OGLOW-2 experiment also should determine when theroptical measurements taken from the Shuttle might be adversely affected by the glow.

As part of the experiment, Dr. MacLean will use newly developed equipment to photograph the Canadian Target Assembly with its different material surfaces. The OGLOW-2 experiment also will study the glow from the Earth's upper atmosphere.

Queen's University Experiment in Liquid-Metal Diffusion (QUELD)

Principal Investigator: Prof. Reginald W. Smith, Queen's University, Kingston, Ontario.

Atoms of any substance, whether liquid or solid, are in constant motion. Knowledge of the rate at which atoms move around and in between each other (diffusion) is important for a variety of industrial processes. On Earth, the effects of convection make it difficult to measure the actual degree of diffusion taking place within a substance. In space, where convection is eliminated, it is possible to obtain more accurate information.

The QUELD experiment will allow diffusion coefficient measurements of a number of liquid state metals. The QUELD apparatus contains two small electric furnaces in which over 40 specimens will be heated in tiny graphite crucibles until the test metals are molten. They will be allowed to diffuse for 30 minutes or more and then rapidly cooled to solidify the metals for post-flight analysis.

The researchers hope to use the data to help develop a general theory to predict the rate of diffusion for any metal in the liquid state, as well as provide fundamental information about the structure of liquid metals. This is expected to lead to creation of better crystals for use in the fabrication of computer microchips and radiation sensors and to the development of special alloys which cannot be made on Earth.

Sun Photo Spectrometer Earth Atmosphere Measurement (SPEAM-2)

Principal Investigator: Dr. David I. Wardle, Environment Canada, Toronto, Ontario.

The measurement of atmospheric structure and composition using space-based instruments has provided a vast new capability for environmental monitoring. SPEAM-2 will add to an expanding body of information about the stratosphere, the part of the upper atmosphere containing most of Earth's protective ozone layer.

The SPEAM-2 experiment comprises two measuring instruments and a control computer developed by the Atmospheric Environment Service of Environment Canada. The Sun Photo Spectrometer (SPS) will make multispectral measurements of ozone and nitrogen compounds which play an important role in controlling ozone balance especially in the presence of chlorine. Atmospheric transmission, or the degree to which light is absorbed in the Earth's atmosphere, also will be measured in the visible and near-infrared parts of the solar spectrum. This hand-held instrument will be aimed at the sun by Dr. MacLean during several sunset and sunrise periods.

The Airglow Imaging Radiometer (AIR) will observe atmospheric air glow from atmospheric molecular oxygen in several regions of the electromagnetic spectrum and possibly from OH radicals, highly reactive molecules composed of oxygen and hydrogen, which affect the ozone concentration in the stratosphere.

These measurements will provide information about the chemical processes which take place in the stratosphere and affect the protective ozone layer. SPEAM-2 data will complement other measurements including those from NASA's Solar Aerosol and Gas Experiment (SAGE) and other ground-based observations.

It is expected that the SPEAM-2 experiment will provide extremely useful information about the upper atmosphere and the capabilities of the new instruments. The engineering data and experience gathered will enable Canadian atmospheric scientists to make more effective use of future space platforms such as research satellites and Space Station Freedom.

Phase Partitioning in Liquids (PARLIQ)

Principal Investigator: Dr. Donald E. Brooks, Department of Pathology and Chemistry, University of British Columbia, Vancouver.

Phase partitioning is being studied as a way of separating, from complex substances, different kinds of cells which differ only subtly in their surface properties.

The process uses two types of polymers (compounds formed by repeated units of similar but not identical molecules) dissolved together in water. They form two solutions, called"phases", which react to one another like oil and vinegar, one floating up to lie on top of the other once they have been mixed and left to stand. When mixtures of small particles such as cells are added to the liquids, some are attracted to one of the phases, some to the other. Consequently, the liquids separate the cell types.

The astronaut will shake a container holding a number of chambers with solutions containing different mixtures of model cells visible through windows. The container then will be observed and photographed at short intervals as partitioning occurs. At the end of the experiment, the separated phases containing their cells will be isolated and returned to Earth. The effects of applying an electric field on the separation process also will be studied.

The ultimate objective is to increase the purity of the separated cells. On Earth, it is difficult to separate substances and achieve maximum purity using this process because of gravity-induced fluid flow. In microgravity, the combined forces acting on the liquids and the cells are entirely different from those on Earth, and the physics of the process can be better understood.

A phase partitioning experiment using the same apparatus was performed by Dr. Roberta Bondar and other crew members during her January 1992 mission. This investigation was itself an extension of an experiment carried out in 1985 on Shuttle mission 51D in which test solutions separated in a way that had not been observed previously. The results of this experiment will be of interest to medical researchers because the results apply to the separation and purification of cells involved in transplants and treatment of disease.

Space Adaptation Tests and Observations (SATO)

Principal Investigator: Dr. Alan Mortimer, CSA, Ottawa, Ontario.

Every flight by a Canadian astronaut includes research into human adaptation to spaceflight. Dr. MacLean's mission is no exception. The data obtained will supplement the results of similar experiments performed during the missions of Drs. Marc Garneau and Roberta Bondar. What follows are descriptions of the investigations which make up the SATO group of experiments.

Vestibular-Ocular Reflex Check

Investigator: Dr. Doug Watt, McGill University, Montreal, Quebec.

An experiment performed by Marc Garneau in October 1984 investigated the effect of weightlessness on the vestibulo-ocular reflex, an automatic response triggered by the vestibular system that keeps the eyes focused on a given object despite head motion. Although researchers expected at least a slight deterioration in the functioning of this reflex, systematic testing revealed no change.

Since these unexpected results were obtained several hours after launch, time during which considerable adaptation could have occurred, it is now necessary to test the vestibulo-ocular reflex at the time of entry into microgravity.

The payload specialist will use a hand-held target and by rotating the head back and forth, determine the ability of the eyes to track correctly.

Body Water Changes in Microgravity

Investigators: Dr. Howard Parsons, Dr. Jayne Thirsk and Dr. Roy Krouse, University of Calgary.

In the absence of gravity there is a shift of body fluids towards the head which leads to the "puffy face" syndrome observed in astronauts after several days of spaceflight. There also is a loss of water from the body early in a spaceflight. Preliminary results from Dr. Roberta Bondar's IML-1 mission indicate that there may be significant dehydration occurring.

This test will determine changes in total body water throughout the spaceflight. The payload specialist will ingest a sample of heavy water at the beginning and end of the mission, and saliva samples will be collected daily. Upon return, the samples will be analyzed to determine total body water.

The results of this experiment are important in developing nutritional protocols for long duration spaceflight and will contribute to the development of countermeasures to be used during re-entry.

Assessment of Back Pain in Astronauts

Investigator: Dr. Peter C. Wing, Head, Department of Orthopedic Surgery, University of British Columbia,, University Hospital, Vancouver.

More than two thirds of astronauts have reported experiencing back pain during spaceflight. The pain seems to be worst during the first few days in space. This may be due to the astronauts' total height increase of up to 7.4 cm as recently documented during Dr. Roberta Bondar's IML-1 mission.

The height increase in the absence of gravity results from spinal column lengthening and the flattening of the normal spinal curves. This probably results from an increase in the water content and thus, the height of the discs between the vertebrae of the spine. This in turn may result in an increase in the distance between the vertebrae and may cause pain from tension on soft tissue such as muscle, nerves and ligaments.

This experiment will continue the investigation of the causes of back pain in space which began during the IML-1 mission. The ultimate goal is to develop techniques to be used either before or during spaceflight to alleviate its effects. During the mission, Dr. Steve MacLean will measure his height and use a special diagram to record the precise location and intensity of any back pain. It is expected that the results of this experiment will lead to an increased understanding of back pain on Earth.

Illusions During Movement

Investigator: Dr. Doug Watt, McGill University, Montreal, Quebec.

Astronauts have experienced the disconcerting illusion that the floor is moving up and down while performing deep knee bends in space and after return to Earth.

The objective of this test is to determine when these illusions occur and to investigate how visual and tactile inputs may affect such illusions. For example, the payload specialist may hold onto a fixed object such as a seat while doing knee bends to see if that alters the illusion of the floor moving.

TANK PRESSURE CONTROL EXPERIMENT/THERMAL PHENOMENA

An important issue in microgravity fluid management is controlling pressure in on-orbit storage tanks for cryogenic propellants and life support fluids, particularly liquid hydrogen, oxygen and nitrogen. The purpose of the Tank Pressure Control Experiment/Thermal Phenomena (TPCE/TP) is to provide some of the data required to develop the technology for pressure control of cryogenic tankage.

TPCE/TP represents an extension of the data acquired in the Tank Pressure Control Experiment (TPCE) which flew on STS-43 in 1991. The flight of TPCE significantly increased the knowledge base for using jet-induced mixing to reduce the pressure in thermally stratified subcritical tanks. Mixing represents a positive means of limiting pressure build-up due to thermal stratification and may allow non-vented storage of cryogenics for some of the shorter duration missions.

Longer missions, however, will require venting and will likely use thermodynamic vent systems for pressure control. The efficient design of either active or passive pressure control systems will depend on knowledge of the thermodynamic processes and phenomena controlling the pressure build-up in a low-gravity environment.

The purpose of the reflight, TPCE/TP, is to focus on the thermal phenomena involved in the self-pressurization of subcritical tanks in a low-g environment.

New technology for managing fluids in low gravity will be required for future space systems, such as the Space Transfer Vehicle, Space Station Freedom, space exploration initiatives, serviceable satellites, hypervelocity aerospace vehicles and space defense systems.

Both TPCE and TPCE/TP are part of NASA's In-Space Technology Experiments Program (IN-STEP), managed by NASA's Office of Aeronautics and Space Technology. The TPCE/TP Project Manager is Richard Knoll, NASA Lewis Research Center, Cleveland. Lewis investigators proposed and are managing the refight. M. M. Hasan from Lewis is the Principal Investigator. Boeing Aerospace Co., Seattle, Washington, developed the original flight hardware.

PHYSIOLOGICAL SYSTEMS EXPERIMENT

The Physiological Systems Experiment-02 (PSE-02) is a middeck payload resulting from a collaboration by Merck & Co.,Inc., and the Center for Cell Research (CCR), a NASA Center for the Commercial Development of Space located at Pennsylvania State University.

Physiological systems experiments use microgravity-induced biological effects, such as bone loss, muscle atrophy, depressed hormone secretion, decreased immune response, cardiac deconditioning, neurovestibular

disturbances or other changes to test pharmaceutical products or to discover new therapeutic agents.

PSE-02 will evaluate a compound being developed to treat osteoporosis. The experiment will test the ability of the compound to slow or stop bone loss induced by microgravity. Merck scientists will examine whether the lower gravity experienced on a space flight accelerates the rate at which bone mass is lost, compared to losses observed when a limb is immobilized on Earth.

The compound to be tested in PSE-02 is currently in large scale human clinical studies as a treatment for osteoporosis associated with menopause. In postmenopausal women, this loss is a consequence of estrogen depletion.

Today, 25 million Americans, primarily women, have the bone-thinning disease known as osteoporosis. Osteoporosis often progresses without symptoms or pain until a fracture occurs, typically in the hips, spine or wrist. Each year, it leads to more than 1.3 million fractures that can cause permanent disability, loss of independence or death.

PSE-02 could help determine if the compound will be useful in treating the bone loss caused by prolonged immobilization of weight-bearing limbs in bedridden or paralyzed patients. The experiment also may have direct application in space, as a preventative for bone loss that might effect astronauts on extended flights.

In this experiment, six healthy, adolescent, male, albino rats will be treated with the Merck developmental anti-osteoporotic compound prior to flight. An equivalent number of flight rats will remain untreated to serve as controls. The two groups will be housed in completely self-contained units called Animal Enclosure Modules (AEMs) during the flight. The AEMs will contain enough food and water for the duration of the mission. No interaction with the crew is required on orbit. A clear plastic cover on the AEM will permit the crew to visually inspect the condition of the rats.

The experiment protocol has been reviewed and approved by the Animal Care and Use Committees of both NASA and Merck. Veterinarians oversee selection, care and handling of the rats.

After the flight, tissues from the rats will be evaluated in a series of studies by teams of scientists from both Merck and the CCR. These studies are expected to last several months to a year.

Dr. W. C. Hymer is Director of the Center for Cell Research at Penn State and co-investigator for PSE. Dr. William W.Wilfinger is the CCR Director of Physiological Testing. Dr. Gideon Rodan of Merck & Co., Inc., is Principal Investigator.

HEAT PIPE PERFORMANCE EXPERIMENT (HPP)

The Heat Pipe Performance experiment is the latest in a series of tests to develop technology that will make it easier for a space vehicle to reject excess heat generated by its equipment and crew.

Current heat control technology — as found on the Shuttle orbiter, for example — uses a complex system of pumps, valves and radiators to dump waste heat into space. A fluid, Freon 21, circulates through a loop where heat is collected and then pumped between two flat plates that radiate the heat to space. But radiators can be damaged by orbital debris and mechanical pumping systems may not be reliable for longer missions.

A heat pipe system provides a simple, highly reliable way to reject heat. It is a closed vessel containing a fluid and does not have moving mechanical parts. Instead, it relies on the natural phenomenon of liquids absorbing heat to evaporate and releasing that heat when condensing. The waste heat generated by a spacecraft evaporates the liquid at one end of the heat pipe, and the vapor condenses and releases heat to space at the other end. Capillary action moves the fluid back to the evaporator end.

The Heat Pipe Performance experiment on STS-52 will evaluate the sensitivity of state-of-the-art heat pipes to large and small accelerations. It also will gather data on the force needed to "deprime" (dry out) heat pipes and how long it takes them to recover.

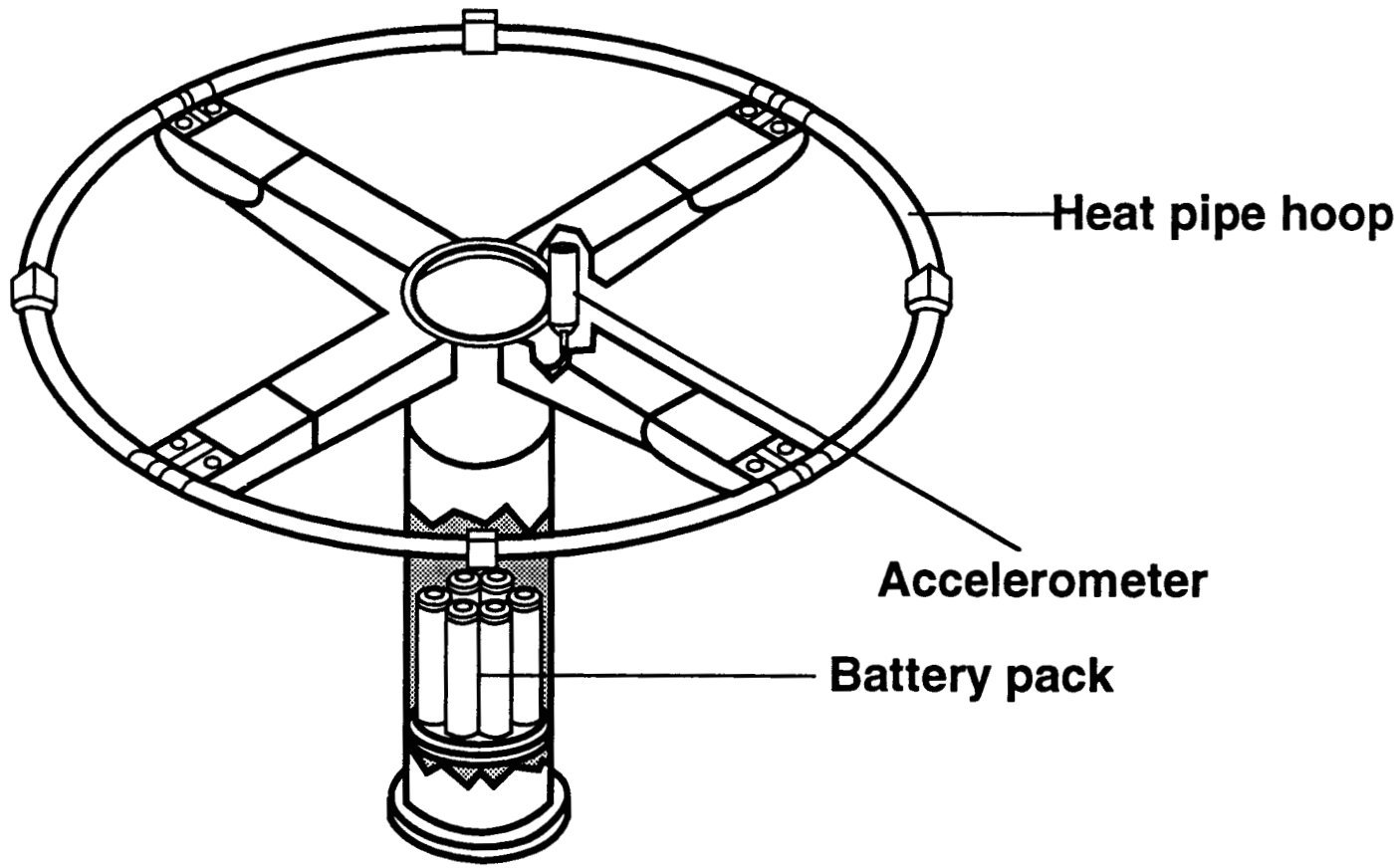
Columbia's crew will test two designs for fluid return by capillary action: eight heat pipes with axial grooves and six with a fibrous wick. Some of the heat pipes consist of a copper vessel with water as the working fluid and the others of aluminum with Freon 113.

During the mission, one or two astronauts will assemble HPP in the orbiter's middeck area and conduct the tests. Four heat pipes will be evaluated in each experiment run by rotating them on a cross-shaped frame. A motor on an instrument unit mounted to the middeck floor will drive the assembly. A battery-powered data logger will record the data.

The HPP device will spin at various rates to simulate different levels of spacecraft acceleration and body forces. Crew members also will do "re-wicking" tests to measure the time needed for the heat pipes to reprime and operate after excessive spin forces make them deprime. Mission plans call for 18.3 hours of HPP flight tests with another 4.5 hours needed for setup and stowage.

Researchers will carefully check the results of the tests with existing computer models and static ground tests to see how well they can predict heat pipe performance in microgravity.

Heat Pipe Performance is part of NASA's In-Space Technology Experiments Program (IN-STEP) that brings NASA, the aerospace



HEAT PIPE PERFORMANCE EXPERIMENT

community and universities together to research potentially valuable space technologies using small, relatively inexpensive experiments.

NASA's Office of Aeronautics and Space Technology selects the experiments and manages the program. Hughes Aircraft Co. designed and built the HPP hardware. The experiment is managed at NASA's Goddard Space Flight Center, Greenbelt, Md.

SHUTTLE PLUME IMPINGEMENT EXPERIMENT

The Shuttle Plume Impingement Experiment (SPIE) will record measurements of atomic oxygen and contamination from Shuttle thruster firings during STS-52.

With sensors located at the end of Columbia's mechanical arm, SPIE will support the CANEX-2 MELEO experiment as it exposes materials to the atomic oxygen in the vicinity of Columbia. During these operations, the mechanical arm will be positioned to place the SPIE sensor package in the direction of travel of Columbia, and the atomic oxygen levels will be recorded on a portable computer in the Shuttle cabin.

To measure contamination from Columbia's steering jets, the SPIE package at the end of the arm will be positioned above the nose of the Shuttle and a large or primary reaction control system (RCS) jet will be fired in its vicinity. Quartz Crystal Microbalances are the sensors used to measure the contaminants. In addition, any particles ejected by the thrusters will be collected via a sticky piece of Kapton material that is part of the sensor package.

Measurements from the quartz sensors will be recorded on the Payload and General Support Computer (PGSC), a portable lap-top computer in the crew cabin of Columbia, for later analysis on the ground. Measurements of the amount and kinds of contamination produced by thruster firings from the Shuttle will assist designers in assessing the materials planned for use in constructing Space Station Freedom.

Contamination will be a part of space station operations because the Shuttle will fire its thrusters as it docks and departs from the station on each visit. Designers want to know what and how much contamination should be planned for in building Freedom. The SPIE principal investigator is Steve Koontz of the Non-Metallic Materials Section in the Structures and Mechanics Division at the Johnson Space Center, Houston.

COMMERCIAL MDA ITA EXPERIMENTS

NASA's Office of Commercial Programs is sponsoring the Commercial MDA ITA Experiments (CMIX) payload, with program management provided by the Consortium for Materials Development in Space (CMDS). CMDS is one of NASA's 17 Centers for the Commercial Development of Space (CCDS). CMDS is based at the University of Alabama in Huntsville (UAH).

Flight hardware for the payload, including four Materials Dispersion Apparatus (MDA) Minilabs, is provided by Instrumentation Technology Associates, Inc. (ITA), Exton, Penn., an industry partner of the UAH CMDS.

ITA has a commercial agreement with the UAH CMDS to provide its MDA hardware for five Shuttle missions. The arrangement is a "value exchange" by which the MDA will be flown in exchange for a designated amount of MDA capacity provided to NASA's CCDS researchers. The agreement is for a 5-year period or until the five flight activities are complete, whichever comes first.

The MDA was developed by ITA as a commercial space infrastructure element and as such, is in support of the Administration's and NASA's Commercial Development of Space initiatives. Financed with support from private sector resources over the past 5 years, the MDA hardware provides generic turnkey space experiments equipment for users who want to conduct suitable science in the microgravity environment of space. The company performs the integration and documentation, thus freeing the user to concentrate on the experiment.

The objective of the CMIX payload is to provide industry and CCDS users with low-cost space experimentation opportunities, thereby supporting one of the objectives of the NASA CCDS program to provide commercial materials development projects that benefit from the unique attributes of space.

The MDA was initially developed to grow protein crystals in space. However, since flying on two Shuttle missions and several suborbital rocket flights, use of the MDA has been expanded to include other research areas, including thin-film membrane formation, zeolite crystal growth, bioprocessing and live test cells. During the STS-52 mission, 31 different types of experiments will be conducted in these research areas.

The goal of the protein crystal growth experiments is to produce larger, more pure crystals than can be produced on Earth. The pharmaceutical industry will use such crystals to help decipher the structure of a protein using x-ray crystallographic analysis. The principal commercial application of such data is in the development of new drugs or treatments.

Data collected from experiments in thin-film membrane formation will be used in gaining an understanding of membrane structures applicable to producing membranes made on the ground. The microgravity environment may be used to develop a more uniform membrane structure, specifically one with few irregularities and with uniform thickness and internal structure. Potential commercial applications of membranes produced in microgravity exist in areas such as gas separation, biotechnology, pollution control and waste stream recovery.

Results from zeolite crystal growth experiments are applicable in improving the manufacturing of zeolites on Earth because those found in nature and made by man are small and do not feature uniform molecular

structures. Zeolites are a class of minerals whose crystal structure is porous rather than solid. Because of this, zeolites are full of molecular size holes that can be used as sieves. Synthetic zeolites are used by the petrochemical industry for catalytic cracking of large hydrocarbon molecules to increase the yield of gasoline and other products. Zeolites also are used to clean up low-level nuclear wastes and other hazardous wastes.

Bioprocessing experiments will provide knowledge on benefits from space processing and on how to improve bioprocessing efforts on Earth. One example is the use of microgravity for self-assembly of macromolecules. This type of research has potential in the development of new implant materials for heart valves, replacement joints, blood vessels and replacement lenses for the human eye. Another commercial application exists with the assembly of complex liposomes and virus particles to target specific drugs to treat cancer.

Recently modified to accommodate live test cells, the MDAs also will carry several human and mouse cell types. Information from live test cells will be used in identifying low-response cells for potential development of pharmaceuticals targeted at improving the undesirable effects of space travel.

In addition to the 31 CCDS- and industry-sponsored experiments, ITA is donating five percent of the four MDA Minilabs to high school students, for a total of seven experiments. Among these student-designed experiments are investigations of seed germination, brine shrimp growth and crystal formation in the low-gravity of space. ITA sponsors these experiments as part of its space educational program.

The MDA Minilab is a brick-sized materials processing device that has the capability to bring into contact and/or mix as many as 100 different samples of multiple fluids and/or solids at precisely timed intervals. The MDA operates on the principles of liquid-to-liquid diffusion and vapor diffusion (osmotic dewatering).

Throughout STS-52, the four MDA Minilabs, each consisting of an upper and lower block, will remain in the thermally-controlled environment of a Commercial Refrigerator/Incubator Module (CRIM). The upper and lower blocks, misaligned at launch, will contain an equal number of reservoirs filled with different substances. When the experiment is activated, blocks will be moved in relation to each other, and the self-aligning reservoirs will align to allow dispersion (or mixing) of the different substances.

To complete microgravity operations, the blocks again will be moved to bring a third set of reservoirs to mix additional fluids or to fix the process for selected reservoirs. A prism window in each MDA allows the crew member to determine alignment of the blocks.

To activate the four MDAs, the crew will open the CRIM door to access the MDAs and the MDA Controller and Power Supply. Activation will occur simultaneously and is required as early as possible in the mission, followed

by minimum microgravity disturbances for a period of at least 8 hours. The crew will operate switches to activate each MDA and once all the MDAs are activated, the CRIM door will be closed.

Deactivation of each MDA will occur at different intervals. For example, one MDA will automatically deactivate within minutes of being activated. Whereas one will not deactivate at all. Deactivation of the other two MDAs will occur later in the mission. Once the Shuttle lands, the MDA Minilabs will be deintegrated, and the samples will be returned to the researchers for post-flight analyses.

Principal Investigator for the CMIX payload is Dr. Marian Lewis of the UAH CMDS. Dr. Charles Lundquist is Director of the UAH CMDS. John Cassanto, President, Instrumentation Technology Associates, Inc., is co-investigator.

CRYSTAL VAPOR TRANSPORT EXPERIMENT

NASA's Office of Commercial Programs is sponsoring the Crystal Vapor Transport Experiment (CVTE) payload, developed by Boeing Defense & Space Group, Missiles & Space Division, Kent, Wash.

The Boeing-designed crystal growth experiment will enable scientists to learn more about growing larger and more uniform industrial crystals for use in producing faster and more capable semiconductors. The CVTE equipment designed to produce these crystals is a precursor to the kinds of scientific work planned to take place aboard Space Station Freedom later this decade.

This experiment is important to the semiconductor industry because the ability of semiconductors to process and store information is dependent on the quality of the crystals used. Thus, large, uniform crystals grown in space may lead to greater speed and capability of computers, sensors and other electronic devices.

Although materials scientists have succeeded in producing very high-quality silicon found in today's computer chips, certain effects caused by Earth's gravitational pull -- known as thermal convection, buoyancy and sedimentation -- have limited scientists' ability to produce more advanced materials on Earth.

Thermal convection is turbulence induced by variations in densities caused by the temperature differences that occur in a material when it's heated. Buoyancy and sedimentation is a similar phenomenon, created by Earth's gravitational pull, that makes less dense materials rise (buoyancy) and denser materials sink (sedimentation). Because of these gravity-induced phenomena, crystals grown on Earth are smaller and less ordered, containing imperfections that limit the capability of transistors, sensors and other types of electronic devices.

In the microgravity environment of space, the Boeing CVTE system will attempt to grow purer and more uniform crystals using a cadmium telluride compound and a process called vapor transport.

The cadmium telluride compound is a solid, sealed inside a glass tube placed inside the CVTE furnace and heated to 850 degrees Celsius. When heated, the compound evaporates and forms two gaseous materials: cadmium and tellurium. This process is reversed during crystallization. Both evaporation and crystallization processes occur in the CVTE glass tube.

Cadmium telluride vaporizes at one end of the glass tube and crystallizes at the other. By carefully controlling the temperatures and temperature profile inside the glass tube, large single crystals can be produced. The high temperature used in this experiment is expected to produce samples as large in diameter as a dime -- whereas previous crystal-growth facilities only have been able to grow samples about the size of a pencil eraser.

Unlike previous, fully automated crystal-growth experiments conducted in space, the Boeing experiment will be tended by the orbiter crew. The CVTE system has a transparent window allowing the crew to observe the growing crystal and adjust its position and furnace temperature to achieve optimum growth.

STS-52 astronauts Bill Shepherd and Mike Baker trained with Boeing scientists to learn to work the CVTE equipment. By having the astronauts monitor and observe the on-orbit crystal growth, it is hoped that they might be able to better interpret the resulting data and ultimately help industry produce superior crystals.

In addition to the astronauts monitoring the experiment, NASA still cameras will document, every several minutes, the rate of crystal growth. Scientists later will use these photos to further analyze the crystal's growth.

The CVTE system is accommodated in a structure about the size of a telephone booth, which will be installed in the galley area of the Shuttle orbiter mid-deck.

Principal investigators for CVTE are Dr. R. T. Ruggeri and Dr. Ching-Hua Su, both of Boeing. The CVTE Program Manager is Barbara Heizer and the Chief Engineer is David Garman, both of Boeing.

COMMERCIAL PROTEIN CRYSTAL GROWTH

The Commercial Protein Crystal Growth (CPCG) payload is sponsored by NASA's Office of Commercial Programs. Program management and development of the CPCG experiments is provided by the Center for Macromolecular Crystallography (CMC), a NASA Center for the Commercial Development of Space (CCDS) based at the University of Alabama at Birmingham. The CMC's goal is to develop the technology and applications needed for successful space-based protein crystal growth (PCG).

Metabolic processes involving proteins play an essential role in the living of our lives from providing nourishment to fighting disease. Protein crystal growth investigations are conducted in space because space-grown crystals tend to be larger, purer and more highly structured than their ground-based counterparts. Having high-quality protein crystals to study is important because they greatly facilitate studies of protein structures. Scientists want to learn about a protein's three-dimensional structure to understand how it works, how to reproduce it or how to change it. Such information is a key to developing new and more effective pharmaceuticals.

The technique most-widely used to determine a protein's three-dimensional structure is x-ray crystallography, which needs large, well-ordered crystals for analysis. While crystals produced on Earth often are large enough to analyze, usually they have numerous gravity-induced flaws. By comparison, space-grown crystals tend to be purer and have more highly-ordered structures, significantly enhancing x-ray crystallography studies. Besides the increased size and quality, space-grown crystals are important because they may be the first crystals large enough to reveal their structure through x-ray analysis.

With the tremendous role that proteins play in everyday life, research in this area is quickly becoming a viable commercial industry. In fact, the profit potential for commercial applications has attracted firms in the pharmaceutical, biotechnological and chemical industries. In response to industry interest, the CMC has formed affiliations with a variety of companies that are investing substantial amounts of time, research and funding in developing protein samples for use in evaluating the benefits of microgravity.

For the past 10 years, exponential growth in protein pharmaceuticals has resulted in the successful use of proteins such as insulin, interferons, human growth hormone and tissue plasminogen activator. Pure, well-ordered protein crystals of uniform size are in demand by the pharmaceutical industry as tools for drug discovery and drug delivery.

Structural information gained from CPCG activities can provide, among other information, a better understanding of the body's immune system, and ultimately aid in the design of safe and effective treatment for disease and infections. For these reasons, CPCG crystal structure studies have been conducted on 7 Shuttle missions starting in 1988.

During 1991 and 1992, other CPCG experiments were conducted on three Shuttle missions, and successful results were obtained using a CMC-developed hardware configuration know as the Protein Crystallization Facility (PCF). These efforts focused on the production of relatively large quantities of crystals that were pure and uniform in size. The space-grown crystals were much larger than their Earth-grown counterparts.

On STS-52, the CPCG flight hardware will consist of the PCF and the third flight of a newly-designed, "state-of-the-art" Commercial

Refrigerator/Incubator Module (CRIM). Its thermal profile is programmed prior to launch, and it monitors and records CRIM temperatures during flight.

The objectives for producing protein crystals using the PCF hardware are to grow them in large batches and to use temperature as the means to initiate and control crystal growth. Using temperature as an activator in the microgravity environment of space is advantageous because essentially no temperature-induced convection currents are generated to interfere with protein crystal growth.

The PCF, as used in two past missions, comprises four plastic cylinders. Each PCF cylinder is encapsulated within individual aluminum containment tubes supported by an aluminum structure. Prior to launch, the cylinders will be filled with protein solution and mounted into a CRIM. Each cylinder lid will pass through the left wall of the aluminum structure and come into contact with a temperature-controlled plate inside the CRIM. As configured for the STS-52 mission, the PCF will comprise 50-milliliter cylinders.

Shortly after achieving orbit, the crew will activate the experiment by initiating the pre-programmed temperature profile. The CRIM temperature will be changed gradually over several days to cause the protein solution to form protein crystals. The change in CRIM temperature will be transferred from the temperature-controlled plate through the cylinder lids to the protein solution.

Changing the solution temperature will allow crystals to form and based on previous experience, these crystals will be well-ordered due to a reduction in the damaging effects of the Earth's gravity. Once activated, the payload will not require any further crew interaction except for periodic monitoring, nor will it require any modifications for landing.

Due to the protein's short lifetime and the crystals' resulting instability, the payload will be retrieved from the Shuttle within 3 hours of landing and returned to the CMC for post-flight analyses. The crystals will be analyzed by morphometry to determine size distribution and absolute/relative crystal size. They also will be analyzed with x-ray crystallography and biochemical assays of purity to determine internal molecular order and protein homogeneity.

The CPCG activities associated with the STS-52 mission are sponsored by NASA's Office of Commercial Programs. Lead investigators for the experiment include CMC Director Dr. Charles Bugg, CMC Deputy Director Dr. Lawrence DeLucas and CMC Associate Director Dr. Marianna Long.

Principal Investigators for CVTE are Dr. R. T. Ruggeri and Dr. Ching-Hua Su, both of Boeing. The CVTE Program Manager is Barbara Heizer and the Chief Engineer is David Garman, both work for Boeing.

STS-52 CREW BIOGRAPHIES

James (Jim) D. Wetherbee, 39, U.S. Navy Commander, is Commander of Columbia's 13th space mission. Selected to be an astronaut in 1984, Wetherbee, from Flushing, N.Y., is making his second Shuttle flight.

Wetherbee served as Pilot on Columbia's STS-32 mission in January 1990 to rendezvous with and retrieve the Long Duration Exposure Facility and to deploy a Navy communications satellite.

A graduate of Holy Family Diocesan High School in South Huntington, N.Y., in 1970, Wetherbee received a bachelor of science degree in Aerospace Engineering from the University of Notre Dame in 1974.

He was commissioned in the U.S. Navy in 1975 and was designated a Naval Aviator in 1976. He has logged more than 3,500 hours flying time in 20 different types of aircraft. His first Shuttle mission lasted 261 hours.

Michael (Mike) A. Baker, 38, U.S. Navy Captain, is Pilot of STS-52. From Lemoore, Calif., he was selected as an astronaut candidate in 1985 and flew his first Shuttle mission aboard Atlantis' STS-43 mission in August 1991.

As a crewmember on that flight, Baker helped in conducting 32 experiments as well as the primary mission to deploy a Tracking and Data Relay Satellite.

Baker graduated from Lemoore Union High School in 1971 and received a bachelor of science degree in Aerospace Engineering from the University of Texas in 1975.

He completed flight training in 1977 and has logged more than 3,600 hours flying time in almost 50 types of aircraft. Baker logged more than 213 hours in space on his first Shuttle mission.

Charles L. (Lacy) Veach, 48, is Mission Specialist 1. Prior to being selected as an astronaut in 1984, he served as an instructor pilot in the Shuttle Training Aircraft used to train pilot astronauts to land the Space Shuttle. Veach from Honolulu, Haw., previously was a mission specialist on STS-39 in April 1991.

Veach was responsible for operating a group of instruments in support of the unclassified Department of Defense mission aboard Discovery to better understand rocket plume signatures in space as part of the Strategic Defense Initiative.

A graduate of Punahou School in Honolulu, Veach received a bachelor of science degree in Engineering Management from the U.S. Air Force Academy in 1966.

He was commissioned in the Air Force after graduation and received his pilot wings at Moody AFB, Ga., in 1967. Veach has logged more than 5,000 hours in various aircraft. His first Shuttle mission lasted more than 199 hours.

William M. Shepherd, 43, Navy Captain, is Mission Specialist 2. He was selected as an astronaut in 1984 and is from Babylon, N.Y. STS-52 is Shepherd's third Space Shuttle flight.

He served as a mission specialist on Atlantis' STS-27 mission, a Department of Defense flight in December 1988. His second flight also was as a mission specialist on STS-41, a Discovery flight in October 1990 to deploy the Ulysses spacecraft designed to explore the polar regions of the Sun.

Shepherd graduated from Arcadia High School, Scottsdale, Ariz., in 1967 and received a bachelor of science degree in Aerospace Engineering from the Naval Academy in 1971. In 1978 he received the degrees of Ocean Engineer and master of science in Mechanical Engineering from the Massachusetts Institute of Technology.

Prior to joining NASA, Shepherd served with the Navy's Underwater Demolition Team, Seal Team and Special Boat Unit. He has logged more than 203 hours in space.

Tamara (Tammy) E. Jernigan, 33, is Mission Specialist 3. Born in Chattanooga, Tenn., she was selected to be an astronaut in 1985. She first flew on Columbia's STS-40 Spacelab Life Sciences-1 mission.

As a mission specialist, Jernigan participated in experiments to better understand how the human body adapts to the space environment and then readapts to Earth's gravity. The Spacelab mission was the first dedicated to life sciences aboard the Shuttle.

She graduated from Sante Fe High School in Santa Fe Springs, Calif., in 1977. She received a bachelor of science degree in Physics and a master of science degree in Engineering Science from Stanford University in 1981 and 1983. Jernigan also received a master of science degree in Astronomy from the University of California-Berkeley in 1985 and a doctorate in Space Physics and Astronomy from Rice University in 1988.

Prior to becoming an astronaut, Jernigan worked in the Theoretical Studies Branch at NASA's Ames Research Center. With her first Shuttle mission, Jernigan has logged more than 218 hours in space.

Steven (Steve) Glenwood MacLean, 37, is Payload Specialist 1. Born in Ottawa, Ontario, he will be making his first Shuttle flight.

MacLean attended primary and secondary school in Ottawa and received a bachelor of science degree in Honours Physics and doctorate in Physics from York University in 1977 and 1983, respectively.

He was one of six Canadian astronauts selected in December 1983. He was designated as the payload specialist to fly with the CANEX-2 set of Canadian experiments manifested on the STS-52 flight.

MacLean is currently actively involved in the development of space technology, space science, materials processing and life sciences experiments that he will perform in space on the mission. He is astronaut advisor to the Strategic Technologies in the Automation and Robotics Program and Program Manager of the Advanced Space Vision System being flown on the mission.

MISSION MANAGEMENT FOR STS-52

NASA HEADQUARTERS, WASHINGTON, D.C.

Office of Space Flight
Jeremiah W. Pearson III - Associate Administrator
Brian O'Connor - Deputy Associate Administrator
Tom Utsman - Director, Space Shuttle

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Richard H. Petersen - Associate Administrator
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Jack Levine - Manager, Space Experiments Office
Arthur R. Lee - Program Manager, Heat Pipe Performance Experiment
Richard A. Gualdoni - Program Manager, Tank Pressure Control Experiment/Thermal Phenomena

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John T. Conway - Director, Payload Management and Operations
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Joanne H. Morgan - Director, Payload Project Management
Mike Kinnan - STS-52 Payload Processing Manager

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Alexander A. McCool - Manager, Shuttle Projects Office
Dr. George McDonough - Director, Science and Engineering
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Otto Goetz - Manager, Space Shuttle Main Engine Project
Victor Keith Henson - Manager, Redesigned Solid Rocket Motor Project
Cary H. Rutland - Manager, Solid Rocket Booster Project
Parker Counts - Manager, External Tank Project
R. E. Valentine - Mission Manager, USMP-1
Sherwood Anderson - Asst. Mission Manager
Dr. S. L. Lehoczky - Mission Scientist, USMP-1
Dr. M. Volz - Asst. Mission Scientist
Lyne Luna - Payload Operations Lead
Rose Cramer - Payload Operations Lead

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Gerald Smith - Deputy Director
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James R. Phelps - Chief, Shuttle Support Office

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ITALIAN SPACE AGENCY

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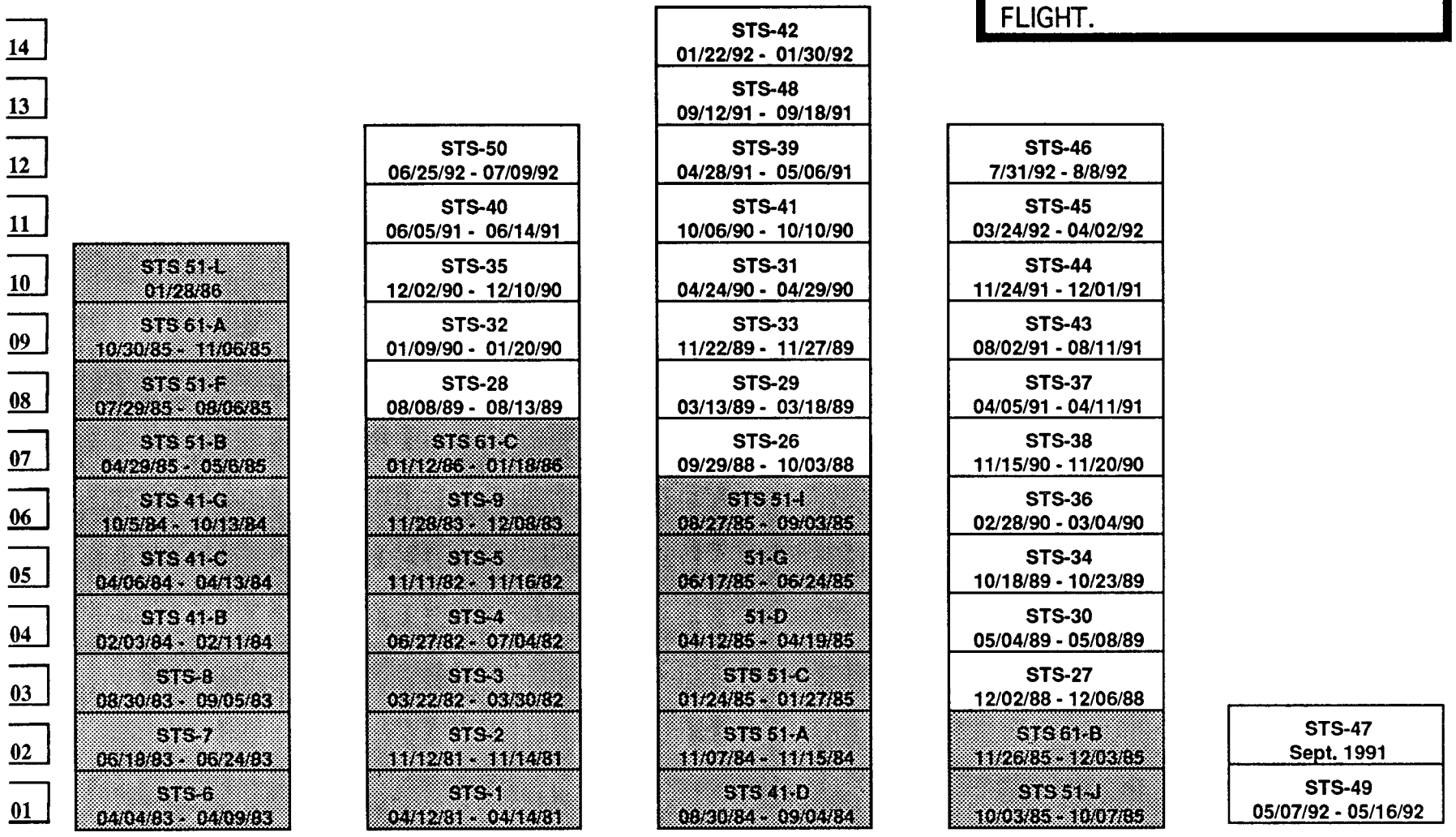
Professor Carlo Buongiorno - Director General, Italian Space Agency
Cesare Albanesi - Program Manager, Lageos II, Italian Space Agency
Giovanni Rum - Program Manager, IRIS, Italian Space Agency
Dr. Roberto Ibba - Mission Manager, Lageos II/IRIS

CANADIAN SPACE AGENCY

W. MacDonald Evans - Vice President, Operations
Bruce A. Aikenhead - CANEX-II Program Manager And Director-General, Astronaut Program
Bjami V. Tryggvason - Alternate Payload Specialist And Payload Operations Director

SHUTTLE FLIGHTS AS OF SEPTEMBER 1992

50 TOTAL FLIGHTS OF THE SHUTTLE SYSTEM - 25 MISSIONS CONDUCTED SINCE RETURN TO FLIGHT.



NASA News

National Aeronautics and
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Washington, D.C. 20546
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Bill Livingstone
Headquarters, Washington, D.C.
(Phone: 202/453-1898)

For Release
September 17, 1992

RELEASE: 92-154

GOLDIN ANNOUNCES INITIATIVES TO IMPROVE NASA PERFORMANCE

WASHINGTON -- NASA Administrator Daniel S. Goldin today announced a series of broad initiatives and activities to improve the way the agency conducts business and works with its contractors.

"We are committed to strengthening America's belief in NASA as the 'can do' government agency," Goldin said at a speech to the American Institute of Aeronautics and Astronautics (AIAA). "And to remaining an institution that provides inspiration, economic and education benefits to all Americans."

The initiatives represent the work over the past several months of the Red and Blue review teams, which have been looking at every NASA program on ways to operate faster, better, and cheaper without compromising safety.

As each of the teams scrubbed through their respective programs, they were tasked to pay particular attention to operational costs that have been growing at an alarming rate.

"We are pleased to report that each team has taken steps to reduce those costs," Goldin said. "We will use those savings to begin planning for new missions, using small spacecraft."

Following are the major initiatives and activities:

NASA'S Program Priorities

** Shuttle Safety Top Priority -- NASA is working to make the shuttle system safer and more reliable. This includes making investments in new display systems to optimize the flight controllers tasks, investing in hardware improvements, improving engine safety, and developing state of the art avionics.

-more-

"Our top priority is Shuttle safety -- the continuation of a safe, robust shuttle program into the early part of the next century, with a maximum of eight flights per year," Goldin said.

** Space Station Freedom Second Priority -- "Our second priority is Space Station Freedom," Goldin said.

NASA is taking steps to ensure its top talent is working on this program, and Goldin said NASA expects contractors to put their best people on the program as well.

** Pooling Award Fees -- To ensure that there is complete cooperation among the contractors working various contracts, NASA is examining the idea of setting aside a portion of the Space Station contractors' award fee and establishi a combined pool.

"The fee paid from this pool would be awarded based on how well the contractors are working as an integrated team in meeting milestones and cost estimates," Goldin said.

** Aeronautics is High Priority -- Goldin said NASA must forge a joint vision with its partners in industry of where we should be heading in commercial aeronautics. The Red and Blue teams recommended that NASA better balance its programs between advanced subsonics, NASP hypersonics and high speed civil transport, including, as an example, shifting more funds to advanced subsonics and noise reduction.

"We need to concentrate on programs that will lay the ground work for future generations of commercial aircraft," Goldin said. "We cannot get there from here if we spread our resources too thin."

"We must also shift more resources to supersonic transport propulsion concepts, aimed at greater fuel efficiencies and lower noise and exhaust emissions," Goldin said.

Goldin announced that in October he will meet with the CEOs of the largest airframe and engine manufacturers to brainstorm and discuss whether they agree with NASA's assessment of priorities in aeronautics.

** EOS, AXAF, and Cassini High Priority -- Delivery on these science missions is a very high priority.

Based on reviews of the Red and Blue teams, it has become clear that the development of suitable instruments is impacting NASA's ability to accomplish these programs on time and within cost estimates.

"We intend to call upon our contractors, scientists from universities, and our field centers to develop a new process to ensure we can provide for early availability of these instruments so crucial to our ability to extend our knowledge of Earth and our solar system," Goldin said.

** Earth Observing Systems (EOS) -- EOS has been rescoped, resulting in several improvements. Tasks have been more clearly defined and therefore can be more readily accomplished.

"The program is more evolutionary now; new capabilities will be phased in," Goldin said. "Some of the potential international collaborations can result in certain EOS measurements being made earlier than was originally envisioned."

The rescoping exercise, and incorporating "common designs" will result in savings of $3 billion, "while still preserving the essential science objectives, as well as launch schedule of the main EOS spacecraft."

An estimated $1 billion will be saved by rescoping and deferrals, including the deletion of the High Resolution Imaging Spectrometer (HIRIS) instrument from the second EOS-AM spacecraft launched in 2003.

Goldin said the deletion of the instrument can potentially be compensated for by a vigorous Landsat program and/or advances in technology that result in lighter weight and lower cost imaging instruments.

** Advanced X-Ray Astrophysics Facility (AXAF) -- AXAF has been restructured into two smaller platforms. The changes will not cause a negative impact on the expected science. The Imaging AXAF mission will be launched into a high Earth orbit, allowing simpler and less expensive support systems for power, communications and pointing control. The small, or spectroscopic, mission will be flown on a Delta class rocket to low Earth orbit.

** Cassini Redesigned -- Fundamental changes will be made in the management approach. Technical managers will be empowered to act as project managers for their subsystems. All elements of a section will report directly to the technical manager. Projected staffing levels will be reduced by over 700 workyears.

Key features of the re-designed mission include: Cassini-unique spacecraft with body-fixed instruments, and a lighter spacecraft permitting the launch by a standard Titan IV vehicle.

** Space Exploration Initiative (SEI) a Priority -- Goldin said NASA will perform the precursor work to ensure the SEI goals are achievable. NASA will also focus on small probes.

"Our goal is to build a credible program in the short term, and with that foundation, work towards more substantial funding in future years," Goldin said.

Other Initiatives

** National Launch System -- The Blue Team recommended changes to the program baseline, which are being coordinated with the Department of Defense, that include the reassessment of the facilities needed, the engine-out requirement for multi-engine configurations, and acceleration of vehicle development.

** Award Fee -- NASA will discuss its final proposed policy on Award Fee Contracting with the NASA-Industry Process Action Team on September 21 and expects to issue a policy for public comment in early October.

** Independent Cost Assessment Group -- NASA will establish a new independent group -- as recommended by the Augustine Committee -- staffed with sufficient resources and modern cost estimating tools, to help ensure its cost estimates are as accurate as possible.

** Cost Overruns -- Goldin said NASA "can no longer afford broken promises." According to a General Accounting Office (GAO) report, in a sample of 29 NASA programs, the average cost growth was 75 percent.

"We can not tolerate contracts so fluid, that the product we bargained for in no way resembles what we end up with," Goldin said.

"We are partners with industry, but we will hold you [contractors] accountable for what you sign up to deliver and ourselves accountable for establishing firm requirements," Goldin said.

"I am confident that if we work as a team we will not only deliver great science, but we will do it on time and within budget. As a team, we will deliver on our promises," Goldin said.

** Town Meetings -- NASA will share its vision, mission and values with the American people during a series of town meetings, scheduled to begin in November, as well as allow prime contractors, small and disadvantaged businesses and the university community to express their views. Planned locations include Hartford, Raleigh-Durham, Tampa, Indianapolis, Los Angeles, and Seattle.

** Headquarters -- NASA is examining the roles and responsibilities of headquarters and the centers. The review is focused on eliminating conflicts caused by a lack of clear lines of authority and responsibility, as well as identifying the tasks that are headquarters' functions that should be transferred to field centers.

- end -

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For Release
September 18, 1992

RELEASE: C92-15

NASA CONTRACT AWARDED FOR NEW SPACE SHUTTLE DISPLAY SYSTEM

NASA recently signed a $59.3 million supplemental agreement with Rockwell International's Space Systems Division, Downey, Calif., for the design, development, test and evaluation of a new system to update Space Shuttle orbiter cockpit displays.

The Multifunction Electronic Display Subsystem (MEDS) will be an upgrade from the existing electro-mechanical flight instruments, multifunction cathode ray tube display subsystem and dedicated display subsystem.

The MEDS display will provide state-of-the-art, color, multifunction interfaces between the flight crew and flight computers, providing astronauts with altitude, airspeed, heading and vehicle attitude information.

The system will be retrofitted into the orbiter fleet providing uncluttered control panels. It will provide multfunction and full-color displays, high reliability and safety, reduced operating costs and increased performance capabilities of the orbiter vehicle displays and support devices.

In addition to the design, development, test and evaluation costs, a ceiling of $89.3 million has been set for production. A final cost will be negotiated after the critical design review.

Work will be completed at Rockwell's Downey, Calif., facility and at the Glendale, Ariz., facility of Honeywell Inc., Satellite Systems Operations.

- end -

NASA News

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For Release

September 18, 1992

NOTE TO EDITORS: N92-82

MARS OBSERVER LAUNCH DATE REAFFIRMED/PRELAUNCH BRIEFING SCHEDULED

NASA today reaffirmed Friday, Sept. 25, as the target launch date of the Mars Observer mission. Today's Launch Readiness Review follows yesterday's successful launch day dress rehearsal for the Titan III rocket.

The launch window opens at 12:27 p.m. EDT and closes at 2:27 p.m. EDT. The countdown lasts 8 hours including built-in holds and will begin at 4:27 a.m. EDT.

The prelaunch news conference will be held at 11 a.m. EDT Thursday, Sept. 24, at the Kennedy Space Center (KSC) News Center. It will be carried live on NASA Select television.

Participating in the briefing will be:

Dr. Lennard Fisk, Associate Administrator, Office of Space Science and Applications, NASA Headquarters, Washington, D.C.

James Womack, NASA Launch Manager
Kennedy Space Center, Fla.

John Gibb, Titan Launch Vehicle Manager
Lewis Research Center, Cleveland

- more -

Sid Saucier, Director, Transfer Orbit Stage (TOS)
Marshall Space Flight Center, Huntsville, Ala.

David Evans, Mars Observer Project Manager
Jet Propulsion Laboratory, Pasadena, Calif.

John Weems, Launch Weather Officer
Cape Canaveral Forecast Facility, U.S. Air Force, Fla.

On launch day, the KSC News Center and the Pass & Identification Building for news media badging at Gate 2, located on State Road 3, Merritt Island, will open at 8 a.m.

Media can view the launch from a remote press site established on the NASA Causeway. All media will be bussed from the Complex 39 Press Site to this location. Shuttle buses will leave periodically starting at 8:30 a.m. with the last bus departing at 11 a.m.

Live television coverage of the launch will begin at 11 a.m. EDT and will continue through launch plus 90 minutes. A postlaunch news conference will be held at the KSC News Center beginning at approximately launch plus 2 hours.

Audio of all NASA Select events also will be carried on the V circuits which may be accessed directly by dialing 407/867-1220-1240-1260. NASA Select is carried on Satcom F2-R, transponder 13, 72 degrees West longitude. A two-way question and answer capability will be available from other NASA centers for the prelaunch and postlaunch news conferences.

Special accreditation is necessary for the launch of Mars Observer. Requests should be sent to:

Accreditation Section
KSC News Center
NASA PA-PIB
Kennedy Space Center, FL 32899

Telephone: 407/867-2468 FAX: 407/867-2692

Photographers desiring to establish remote cameras at Complex 40 on L-1 day should contact the audio visual section of the KSC News Center at 407/867-7819.

- end -

NASA News

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For Release

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September 21, 1992

Barbara Schwartz
Johnson Space Center, Houston
(Phone: 713/483-5111)

NOTE TO EDITORS: N92-83

STS-52 AND MARS OBSERVER PREFLIGHT BRIEFINGS SET

Briefings on Shuttle mission STS-52, scheduled for mid-October, and the Mars Observer mission, to be launched Sept. 25, will take place Sept. 24 from 9 a.m. to 3:45 p.m. EDT.

TIME	BRIEFING/BRIEFERS	LOCATION
9:00 a.m.	STS-52 Mission Overview Bob Castle, Lead Flight Director	JSC
10:00	Canadian Experiment-2 Bruce Aikenhead, Director General Canadian Astronaut Program Office	JSC
10:30	LAGEOS-II Program Overview Louis O. Caudill, LAGEOS-II Program Manager (NASA Hqs.)	JSC
	LAGEOS-II Science Dr. Ronald Kolenkiewicz, LAGEOS-II Project Scientist (GSFC)	
	LAGEOS Mission James Murphy, LAGEOS-II Project Manager (GSFC)	
	LAGEOS-II/IRIS Roberto Ibba, LAGEOS-II/IRIS Program Manager (Italian Space Agency)	

- more -

11:00	Mars Observer Briefing	KSC
2:00 p.m.	United States Microgravity Payload-1 Overview Ed Valentine, USMP-1 Mission Manager (MSFC)	MSFC
	USMP-1 Science Overview Dr. Sandor Lehoczky, USMP-1 Mission Scientist (MSFC)	
	Lambda Point Experiment Dr. John Lipa, Principal Investigator, Stanford University	
	MEPHISTO Experiment Jean-Jacques Favier, Principal Investigator Commissariat a l'Energie Atomique	
2:45	STS-52 Crew Briefing James D. Wetherbee (Cdr, USN), Commander Michael A. Baker (Capt, USN), Pilot William M. Shepherd (Capt, USN), Mission Specialist Tamara E. Jernigan, Ph.D., Mission Specialist Charles Lacy Veach, Mission Specialist Steven G. MacLean, Ph.D., Payload Specialist, Canadian Astronaut Program	JSC

The astronauts will be available for approximately an hour after the briefings for round-robin interviews. Reporters wishing to participate in the interview sessions should notify the JSC newsroom by noon on Sept. 23.

Only the briefings will be carried on NASA Select television with two-way audio for questions from NASA Headquarters and other centers. NASA Select programming is carried on SATCOM F2R, transponder 13, located at 72 degrees west longitude.

-end-

NASA News

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For Release

Michael Braukus
Headquarters, Washington, D.C.
(Phone: 202/358-1547)

September 23, 1992

N92-84

EDITORS NOTE: SEARCH FOR INHABITABLE PLANETS TO BEGIN

The NASA program Toward Other Planetary Systems will begin a microwave search for other inhabitable planets on Oct. 12, 1992.

News media wishing to cover either the sky survey at Goldstone, Calif., or the targeted search at Arecibo, Puerto Rico, should contact the following public affairs officers:

For Goldstone -- Mary Hardin
Jet Propulsion Laboratory, Pasadena, Calif.
(Phone: 818/354-5011)

For Arecibo -- Michael Mewhinney
Ames Research Center, Mountain View, Calif.
(Phone: 415/604-9000)

Because of limited parking, use of private vehicles at both sites will be restricted. Chartered buses will be available at both locations to transport reporters.

- end -

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Michael Braukus
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September 23, 1992

Jean Drummond Clough
Langley Research Center, Hampton, Va.
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RELEASE: 92-155

SCIENCE EXPEDITION TARGETS NEW ATMOSPHERIC OZONE POLLUTION

More than 200 scientists from 13 countries are participating in a science expedition, spearheaded by NASA, to investigate newly discovered concentrations of harmful ozone over large regions of southern Africa and Brazil.

Believed linked to massive biomass burning on the two continents, the pool of ozone pollution was recently uncovered by satellite analysis. Biomass burning is the consumption by fire of forests or fields. Unlike stratospheric ozone, which is a critical shield against harmful ultraviolet radiation, ozone in the lower atmosphere is a pollutant.

Investigation of the new phenomenon will employ a variety of high-tech instrumentation including observations from satellites, aircraft and ground platforms. The field campaign, which began in mid-September, will extend through most of October.

In addition to satellite surveillance, NASA's DC-8 "flying laboratory" from the Ames Research Center, Mountain View, Calif., will participate. The Space Shuttle Endeavour, on its September mission, photographed African and South American smoke palls to provide new visual perspective on the nature of the emissions.

The South American iinvestigation is a joint effort between the space agencies of the United States and Brazil. Satellites, specially instrumented Brazilian aircraft, the NASA DC-8 and balloon-borne sampling platforms will be used to address the source areas in central Brazil and track the long-range distribution of gases as they move into the southern tropical Atlantic.

- more -

The African portion of the experiment is a collaboration of European, African and North American scientists to investigate fires in savanna (grassland containing scattered trees and undergrowth) in southern Africa, movement of fires across that continent and the relationship between fires, savanna ecology and atmospheric chemistry. Measurements from ground, tower, balloon and airborne platforms will be integrated with data from the Brazilian investigation and with satellite observations.

Scientists in both projects acknowledge that the movements and chemical mechanisms of this ozone anomaly are extremely complex and that explanations up to this point have been speculative. These new investigations will be the first to provide concrete insights on the global impact of tropical biomass burning.

Some scientists believe the effects of emissions from the biomass burning on the atmosphere's chemistry are comparable to those from fossil fuels in the northern latitudes. The emissions from the burning undoubtedly have some effect on the Earth's climatic balance, but whether this could lead to net warming or cooling is still open to speculation.

Scientists should get a better understanding of the processes involved in these mechanisms when the data are analyzed and interpreted.

- end -

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For Release

September 23, 1992

RELEASE: 92-156

STUDENT PAYLOAD SUCCESSFULLY LAUNCHED ON NASA ROCKET

The first student managed and built payload flown on a NASA sounding rocket was launched successfully Monday, Sept. 21, from the NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Va.

The pilot project, known as the Colorado Student Ozone Atmospheric Rocket (CSOAR), was developed to demonstrate the use of sounding rocket flight as a valuable educational tool for undergraduate and graduate students.

"This is like winning the Super Bowl the first time you try," said Elaine Hansen, Director of the Colorado Space Grant Consortium.

"It was amazing, beyond words," exclaimed Greg Essmeier, a student from Colorado State University at Fort Collins.

The payload, designed to measure ozone density in the atmosphere, was carried aloft by a NASA single stage Orion sounding rocket at 2:32 p.m. EDT. After reaching a 33.5 mile (53.9 kilometer) altitude in 116 seconds, the payload descended by parachute into the Atlantic Ocean where it was recovered by the U. S. Coast Guard from Chincoteague, Va.

The project was a joint venture between NASA and the Space Grant Consortiums in Colorado and Virginia.

- more -

"This mission was conducted in a very professional manner and will serve as a model for future projects of this type," according to Joseph McGoogan, Director of Suborbital Projects and Operations at Goddard Space Flight Center, Greenbelt, Md.

"It was a real team effort. It wasn't just one person doing it," said Dan Shrosphire, a graduate student from the University of Colorado at Boulder, referring to the students working at seven different sites during the launch.

More than 50 students from six participating Colorado colleges and universities developed the CSOAR payload during the past 2 years. Virginia students provided public affairs support and also will provide post-flight data comparison.

The data will be analyzed and compared with data gathered by NASA's Earth Radiation Budget Satellite. Results are expected in about 2 months.

The CSOAR launch is supported by the overall NASA Sounding Rocket program, managed at Wallops for NASA's Office of Space Science and Applications, Washington, D.C. The NASA program consists of approximately 30 sounding rockets launched each year from various worldwide locations.

- end -

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For Release

David W. Garrett
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

September 25, 1992

RELEASE: 92-157

GOLDIN ANNOUNCES MINORITY GOALS AND ADVISORY COMMITTEE

NASA Administrator Daniel S. Goldin today announced new minority contract goals and the formation of a NASA Minority Business Resource Advisory Committee.

Speaking before the Braintrust on Science and Technology for the Congressional Black Caucus, Goldin Said, "While broadening our workforce, we also seek to broaden our contractor base. We are committed to making NASA's small and disadvantaged business program the best in the country -- an example that government and industry will seek to emulate."

"While Congress has imposed on NASA an 8 percent goal for contracting to small and disadvantaged businesses, NASA has upped the ante. Congress did not set a deadline for meeting the goal, but we have imposed one on ourselves: 1994. Between now and the end of fiscal year 94, we plan to offer one billion dollars worth of prime and subcontracting opportunities to minority and woman-owned businesses" Goldin remarked.

Goldin outlined the steps that NASA will take to meet this goal:

o Establish firm percentages for small and disadvantaged business subcontracting as part of our prime contracts;

o Make use of small and disadvantaged business subcontracting as an important evaluation factor in every source selection and;

o Reward prime contractors with special award fees when they exceed their subcontracting goals by certain percentages.

- more -

In announcing a new minority committee, Goldin said "I'm pleased to announce today that we are setting up a NASA Minority Business Resource Advisory Committee. This committee will help us identify more businesses that should be a part of the NASA family. I invite you to nominate members for this committee. This committee will help disprove the notion that there are no high tech small and disadvantaged businesses. We know they're out there and we'll find them and nurture them because we want to work with firms that have the desire to reach for the American dream."

NASA Education Programs

Addressing NASA's minority education programs, Goldin said, "Two weeks ago, Congressman Stokes issued two challenges to NASA: work with other government agencies to increase the number of minorities getting degrees in engineering, science and math; and do more to help education in the major cities where the largest numbers of minority students reside. Those are two challenges that we accept."

Goldin emphasized several NASA minority educational programs that are already helping to meet these challenges:

o The SHARP program that puts minority high school students in NASA labs over a summer to work with engineers and other professionals.

o The Spacemobile program that reaches hundreds of thousands of elementary school students and distributes science and math teaching materials to their teachers and;

o At the university level, NASA has doubled research grants and other assistance to Historically Black Colleges and Universities to $20 million over the last 8 years.

In closing, Goldin said, "Our citizens need hope and opportunity. Common sense tells us that we can't focus exclusively on the present. We need to make some investments that will pay off in terms of new technology, new knowledge and new jobs in the future -- which is exactly the kind of future NASA represents."

- end -

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David W. Garrett
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

September 25, 1992

RELEASE: 92-158

MINORITY CONTRACTORS OF THE YEAR AWARDS ANNOUNCED

NASA Administrator Daniel S. Goldin announced today the recipients of the Minority Contractor and Subcontractor of the Year Awards in recognition of minority businesses that have made outstanding contributions to NASA.

Named Minority Contractor of the Year was Jackson & Tull, Chartered Engineers, of Seabrook, Md. B & W Services, Inc., Bay St. Louis, Miss., was selected as Minority Subcontractor of the year.

Speaking before the Black Business Association of Los Angeles on their 17th annual trade mission to Washington, D.C., Goldin said, "These awards recognize the outstanding performance and overall excellence of the many small and disadvantaged businesses that contribute to the NASA mission."

Jackson and Tull, nominated by the NASA Goddard Space Flight Center, Greenbelt, Md., was cited for providing outstanding and critical technical support in meeting demanding requirements and schedules as part of a high visibility program such as the Hubble Space Telescope.

B & W Services, Inc., was nominated by Johnson Controls World Services, Inc., the prime contractor for facility operating support service at the NASA John C. Stennis Space Center, Miss. As a subcontractor to Johnson, B & W provides the personnel, management, documentation and controls necessary to perform custodial services to buildings and trailers which incorporate some 1,900,000 square feet of space. The award citation notes that B & W is an outstanding firm that has consistently provided excellent support to the Stennis center for many years.

Administrator Goldin will present the awards on Oct. 1 at NASA Headquarters, Washington, D.C.

- end -

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For Release

September 29, 1992

RELEASE: C92-16

EARTH DATA, INFORMATION SYSTEM CONTRACTOR SELECTED

NASA has selected Hughes Information Technology Co., Seabrook, Md., for negotiations leading to the award of a cost-plus-award-fee contract to design, develop, test and integrate, maintain and operate the Earth Observing System Data and Information System Core System (ECS).

The ECS will be a geographically distributed system supporting operations and management of Earth Observing System (EOS) in-orbit payloads and other U.S. Earth-observing spacecraft. ECS will support the acquisition, processing, archival, and distribution of EOS data and selected non-EOS data (e.g., Earth Probe data, Pathfinder data sets).

Hughes' proposed cost and fee is $685 million. NASA expects to conclude negotiations and award this contract in January 1993 with performance extending through 2003.

"Hughes' proposal was clearly superior in technical approach, as exemplified by extensive systems analysis, in-depth understanding of the diverse nature of the user community and a strong commitment to standards and an open systems approach," said Lennard Fisk, NASA's Associate Administrator for Space Science and Applications. "I am also pleased that Hughes made a substantial commitment to small and disadvantaged businesses within its total ECS Effort."

-end-

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For Release
September 29, 1992

RELEASE: 92-159

1992 ANTARCTIC OZONE SETS NEW SIZE RECORD

Preliminary results from NASA's Total Ozone Mapping Spectrometer (TOMS) onboard the Nimbus-7 satellite show that the area of the 1992 Antarctic ozone hole is the largest on record.

The previous surface area covered by low total ozone values, less than 220 Dobson Units, typically has reached near 7.7 million square miles. On Sept. 23, 1992, the surface area covered by low total ozone reached 8.9 million square miles, an increase in size from 1991 of approximately 15 percent.

By comparison, the surface area of the North America continent is 9.4 million square miles. The U.S. 48 contiguous states have a surface area of approximately 3 million square miles, while Antarctica has a surface area of 5.1 million square miles.

Since the mid-1980s, the region covered by low total ozone values begins to grow in early August. The region covered usually reaches its greatest extent in early-October. This is the fifth year since 1986 that large seasonal ozone reductions over the Antarctic have been observed.

The minimum total ozone value on Sept. 23 was 131 Dobson Units. A record low of 111 Dobson Units was set on Oct. 6, 1991 near the South Pole. One Hundred Dobson Units equals a layer of gas one millimeter thick at its surface. The lowest 1992 value probably will not be observed for several weeks, report scientists at NASA's Goddard Space Flight Center, Greenbelt, Md.

- more -

Chlorine, Sulfuric Acid And Cold Temperatures

Scientists believe man-made chlorine is the primary cause for ozone hole formation. This year's hole also may have been affected by the continued presence of sulfuric acid droplets in the upper atmosphere created by the eruption of Mount Pinatubo in the Philippines in June 1991.

Goddard scientists noted that middle stratospheric temperatures, recorded by the National Oceanic and Atmospheric Administration's National Meteorological Center, were colder than normal. These colder temperatures would contribute indirectly to larger ozone losses.

Further research is required to determine the role of these phenomena with respect to the low total ozone values seen this year, according to Goddard scientists.

Ozone, a molecule made up of three atoms of oxygen, comprises a thin layer of the upper atmosphere which absorbs harmful ultraviolet radiation from the sun. "Ozone hole" is a term used to describe a large area of intense ozone depletion that occurs over Antarctica typically during late-August through early-October and breaks up in mid-November.

The Nimbus-7/TOMS has measured Antarctic ozone levels since November 1978. Since the discovery of the ozone hole in 1985, TOMS has been the key instrument for monitoring ozone levels throughout the southern hemisphere.

The NASA TOMS instrument on the Russian Meteor-3 satellite, launched in August 1991, is compatible with the Nimbus-7/TOMS instrument and has shown similar results.

The TOMS instruments and the Nimbus-7 satellite are managed by the Goddard Space Flight Center for NASA's Office of Space Science and Applications, Washington, D.C.

- end -

EDITORS NOTE: A photograph of eight false-color images of Nimbus-7/TOMS data is available to media representatives by calling NASA Headquarters Audio/Imaging Branch on 202/453-8375.

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For Release
September 30, 1992

NOTE TO EDITORS: N92-86

SHUTTLE MISSION STS-53 PREFLIGHT BRIEFINGS SET FOR OCT. 6

Space Shuttle mission STS-53 preflight briefings will be held Oct. 6 at the Johnson Space Center, Houston, Building 2, room 135, from 10 a.m. until 3 p.m. eastern time.

The primary payload for this dedicated Department of Defense (DoD) mission is classified and will not be discussed in pre- and post-mission briefings and materials nor will it be discussed during the course of the mission itself.

STS-53 Lead Flight Director Rob Kelso will provide a mission overview (with the exception of primary payload operations), followed by DoD and NASA briefings on secondary experiments in the cargo bay and on the mid-deck.

After a lunch break, the astronaut crew will brief their mission assignments (excluding primary payload activities and responsibilities).

The astronauts will be available for round-robin interviews following the press conference. News media representatives wishing to participate in the crew interviews should notify the JSC newsroom by noon Oct. 5.

Only the briefings will be carried live on NASA Select television with two-way audio for questions from NASA Headquarters and other centers. NASA Select programming is carried on Satcom F2R, transponder 13, located at 72 degrees west longitude.

- end -